Identification as Determining Factor of Technology Acceptance for Hedonic and Dual Use Products

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Declaration

I herewith declare that I wrote the presented thesis without any help besides the explicitly mentioned.

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List of Abbreviations

IAD: Institute of Ergonomics

TAM: Technology Acceptance Model

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1 Introduction

In the early 1980's companies first invested extensively in information technology to enhance their work performance. Unfortunately, the high investment had often low returns because the employees refused to use the new technologies or could not use them to full extent due to technology design problems. Those days can be seen as the starting point for technology acceptance research. Predicting and explaining the acceptance of information technology has become a major goal and a very vital research area evolved. However, in this tradition technology acceptance is seen from an organisational and utilitarian point of view (Turel, Serenko, & Bontis, 2010). This viewpoint led to a very strict goal orientation and a focus on the utility and usability of a product. Those products that are mainly used because of their expected capability to support the user in the fulfilment of his externally given or internally generated behavioural goals are termed utilitarian products within this thesis.

The focus on organizations and utilitarian products may have been justifiable in times, when the private use and ownership of technical products was rare, but the importance of non-utilitarian products has increased over the last few decades. According to EE Times (www.eetimes.com) consumer electronics – as subspecies of non-utilitarian products – are supposed to be sold for over 1 trillion $ in 2011, which is a strong indicator on the global importance of consumer electronics for the global economy. Furthermore, this indicates that there is a high consumer interest in using technical products for non-utilitarian purpose, e.g. recreation and having fun. This usage is termed hedonic consumption (Hirschman & Holbrook, 1982) and is well-noticed in different research areas like consumer research (e.g. Hirschman, 1982; Langrehr, 1991; Babin, Darden, & Griffin, 1994; Khanx, Ratner, & Kahnemann, 1997; Hopkinson & Pujari, 1999; Lim & Ang, 2008) and user experience research (e.g. Shin, 1998; Wang, Chen, Chan, & Zheng, 2000; Fiore, Jin, & Kim, 2005; Song, Fiore, & Park, 2007; Bridges & Florsheim, 2008; Tynan & McKechnie, 2009). Within this thesis, it is assumed that products that are mainly used due to their expected capability to evoke positive – or negative – emotions, independent of any utilitarian outcomes of the product usage, can be seen as hedonic products. Examples of hedonic products would be gaming consoles or music players. Additionally, a great number of products exist that do not fulfil only one purpose, but support the user in multiple ways. This includes the fulfilment of his personal needs, which can be seen as hedonic quality of a product according to Hassenzahl, Diefenbach and Göring (2010) and the fulfilment of utilitarian goals. Products that can be used with focus on hedonic

and/or utilitarian aspects are termed dual use products within this thesis. A typical representation example of a dual use product would be the smart phone, because it may be used, for example, for playing music and managing an office calendar. Dual use products are highly attractive, because only one product is needed to satisfy different consumer needs. This attractiveness is reflected by the rising consumer interest. BITKOM (www.bitkom.de) reported a 39% grow in the sales of smart phones in the year 2010 for Germany.

Due to the great consumer interest in hedonic and dual use products, it can be assumed that the number of newly developed products will further rise in the next years. The development of new products – independent of their utilitarian, hedonic or dual nature – is associated with high costs for companies and each company has to bear the financial risk on its own. According to Schneider and Hall (2011) Microsoft invested over $500,000,000.00 in the marketing of Windows Vista, but due to compatibility and performance problems the system flopped. Falling behind the consumers' expectations is one of the top five reasons for unsuccessful product launches (Schneider & Hall, 2011). Depending on the company, a failed product launch can grow into an existential threat. To eliminate this risk it is essential to predict if a product will be accepted by its prospective users in the early stages of the product development process. Additionally, technology acceptance research can be used to explain the success of already existing products. This might help companies to improve their own products and to better understand their prospective users.

But not only companies are highly interested in the results of technology acceptance research. Even consumers benefit from a better understanding of underlying acceptance processes. If products are developed with respect to the consumers' expectations, the probability of buying unsatisfying products decreases. This is even more important in the context of hedonic products, because it can be assumed that they are mainly bought by consumers as private persons and a bad buy therefore directly influences the consumers' mood. This would be due to the fact that the customer invested his own time and money in the selection and purchase process of the product.

Even though well-validated models exist for the explanation of user acceptance for utilitarian products, those models do not succeed in explaining technology acceptance of hedonic and dual use products and are therefore often adapted and extended to meet the needs of new contexts (cf. Davis, Bagozzi, & Warshaw, 1992; Moon & Kim, 2001; Heijden, 2004; Klopping & McKinney, 2004; Brunar II & Kumar, 2005; Chesney, 2006; Tzou & Lu, 2009; Ha & Stoel, 2009; Shin, 2009). This can be ascribed to the main explanatory factors – per-

ceived usefulness and perceived ease of use – of those models, which focus on effectiveness and efficiency. This is in line with Tiger (1992), who analyzed pleasure in general and states that "Certainly in the industrial world, and since industrialization everywhere else too, there has been overwhelming emphasis on productivity, efficiency, labour discipline, and the relationship between time and wealth. This has yielded far greater attention to the role and organization of work and wealth than to leisure and pleasure" (p.22). But also due to the shift of consumer interest the focus in technology acceptance research shifted over the last years from facilitating organizational processes to provide enjoyment and other hedonic values (Hong & Tam, 2006). Still, the explanatory power of the models remains low (cf. Heijden, 2004) and thereby, their applicability for practice is problematic. This is partially due to the lack of an explicit definition of technology acceptance for hedonic and dual use products, because it can be assumed that operational definitions used in organizational contexts to measure technology acceptance for utilitarian products do not work well in practice. Another reason is the omission to consider further hedonic qualities besides perceived enjoyment. Even in research where additional factors were considered (e.g. *perceived playfulness* in the model of Moon & Kim, 2001) the results were unsatisfying, because relevant aspects like the usage situation remained unconsidered. Some of the open points will be addressed within this thesis. The exact scope is defined in the next section.

1.1 Scope of this thesis

Due to the lack of technology acceptance models that explain a sufficient amount of variance of acceptance of hedonic and dual use products, a new technology acceptance model will be developed that overcomes these shortcomings. This model will be deduced from existing technology acceptance models and expanded with findings from literature that apply to the acceptance of hedonic and dual use products. Because it turned out that technology acceptance is heavily dependent on the usage mode (cf. Chesney, 2006) this model will be investigated within different usage modes. The aim is to find systematic variations of technology acceptance between different usage modes and product characters.

To be able to deduce and to investigate the new technology acceptance model for hedonic and dual use products, the construct technology acceptance will be explicitly defined. This definition will be restricted to the context of hedonic and dual use products. The definition and the restriction of the applicability are necessary for the deduction of valid metrics, which are grounded on the definition of the construct technology acceptance. Furthermore,

the explicit definition of technology acceptance of hedonic and dual use products will foster a common understanding of technology acceptance, which is the basis for the comparability of different studies in this area. This comparability can be used for the deduction of generalisable results, instead of focussing on single studies and thereby helps to improve the theoretical foundation and validation of technology acceptance research.

Outside the focus of this thesis are the investigation of changes of the technology acceptance over time and the investigation of usage duration in field settings. Even though objective usage and usability data was assessed during the investigation of the model, this data will not be analyzed in the context of this thesis because it is not needed for a model assessment.

1.2 Structure of this thesis

In Chapter 1 of this thesis the topic was introduced and the importance of technology acceptance of hedonic and dual use products was explained. Afterwards, the scope of this thesis was defined (Chapter 1.1) and within this section, the structure of the thesis is presented.

Chapter 2 will present the theoretical foundation of this thesis. Because this thesis focuses on the development and validation of a technology acceptance model for hedonic and dual use products the first step will be the definition of product character and a differentiation between hedonic, dual use, and utilitarian products (Chapter 2.1). Then, the construct technology acceptance will be defined on the basis of existing definitions and an analysis of their strength and weaknesses (Chapter 2.2). This definition is followed by an overview of existing technology acceptance models and a deeper investigation of the Technology Acceptance Model (TAM) and its extensions (Chapter 2.3). Here, the most promising model for an adjustment to hedonic and dual use products will be chosen. Afterwards, hedonic qualities will be introduced with focus on human needs as basis for the selection of relevant explanatory factors (Chapter 2.4). Those factors will be used for the expansion of the chosen model in Chapter 2.3. Chapter 2 ends with the introduction of the usage modes (Chapter 2.5). Those modes will be considered within the empirical studies.

In Chapter 3 the chosen model from Chapter 2.3 and the additional influence factors from Chapter 2.4 will be combined to the research model. This model is then discussed in detail, which includes the deduction of interrelationships between the constructs (Chapter

3.1). The research hypothesis will then be deduced from the theory and operational definitions of the constructs are presented (Chapter 3.2).

The empirical investigation of the model is presented in Chapter 4. First, the general methodology and the measures will be presented (Chapter 4.1). Afterwards, each of the three studies of this thesis is presented within its own section (chapters 4.2, 4.3, and 4.4). This includes adoptions of the methodology for each study as well as the results for each study. Comprehensive results for all three studies will be given in Chapter 4.5.

Chapter 5 is dedicated to the discussion and conclusion of this thesis. The findings of all studies will be discussed in Chapter 5.1, whereas methodological issues are discussed in Chapter 5.2. The conclusion closes Chapter 5 (Chapter 5.3).

In Chapter 6 the implications for research (Chapter 6.1) and application (Chapter 6.2) are discussed. Finally, Chapter 7 summarizes this thesis.

2 State of the Art

This chapter gives an overview over the current state of the art for technology acceptance and hedonic qualities. Because this thesis aims for the explanation of technology acceptance of hedonic and dual use products, a definition of those products is the starting point for this chapter. Then, the term technology acceptance will be defined and existing models that aim to explain technology acceptance will be presented. Each of the presented models will be investigated with respect to its applicability for the explanation of technology acceptance of hedonic and dual use products. As a result, the most promising model will be chosen and further developed in the Chapter 3. As basis for this further development, current research in the field of user experience will be investigated to identify factors that are relevant in evoking a positive attitude towards products. Finally, the importance of the task a user performs will be further examined and consequences for the final research model will be deduced. The final research model itself and the according hypotheses will be presented in the next chapter (Chapter 3).

2.1 Product Character

In consumer behaviour literature a distinction between utilitarian and hedonic products is made. According to Hirschman and Holbrook (1982, p. 92) hedonic consumption can be seen as "those facets of consumer behaviour that relate to the multisensory, fantasy and emotive aspects of one's experience with products." Products that are mainly object to hedonic consumption are seen as hedonic products. Another definition of hedonic products goes back to Chesney (2006), who talks about "recreational systems" in his paper on "An Acceptance Model for Useful and Fun Information Systems". In his work, a recreational system was defined as a system "where interaction with the system is in itself pleasurable for the user, and interacting with the system produces nothing more than this pleasure. The goal of such a system is prolonged use rather than productive use" (Chesney, 2006, p.226). According to Heijden (2004, p. 696) a "Hedonic system aim[s] to provide self-fulfilling value to the user. [...] In its purest form, interacting with a hedonic system is designed to be an end in itself". Hirschman and Holbrook (1982, p. 96) included in their definition of hedonic consumption the raise of emotions – positive as well as negative ones. This includes findings of earlier studies in consumer research that were able to show that consumption of products that evoke negative emotions can help to deal with unpleasant experiences (e.g. Suomi & Harlow 1976, cited by Hirschman & Holbrook, 1982). Therefore, within this thesis hedonic products are

referred to as products that are used due to their expected capability to evoke positive and negative emotions, independent of any utilitarian outcomes of the product usage. This capability is referred to as hedonic product character.

In contrast to hedonic systems Heijden (2004, p. 696) defines the objective of a utilitarian information system as enhancement in "the user's task performance while encouraging efficiency". Hassenzahl (2003, p. 34) states that pragmatic products are used "to fulfil externally given or internally generated behavioural goals". The terms "pragmatic product" and "utilitarian product" can be used synonymously. For this thesis, the term utilitarian product is applied. In line with both authors, utilitarian products are defined as products that are used because of their expected capability to support the user in the fulfilment of his externally given or internally generated behavioural goals. That includes providing the necessary utility as well as allowing the user easy access to that utility. This utilitarian capability of a product is referred to as pragmatic product character.

Concluding, dual use products are defined as products that have hedonic and pragmatic qualities and therefore can be used as hedonic product as well as utilitarian product, depending on the user's objective. A good example for a dual use product would be a laptop, which can be used to support a user's goal (e.g. writing a letter) as well as for recreational aspects (e.g. listening to mp3s). It is assumed that most products can be seen as dual use products, whereas the predominant perception of the product characteristics depends on the usage mode respective to the task a user performs (discussed in section 2.5). Therefore, it is assumed, in line with Chesney (2006), that products can be perceived on a two dimensional scale. One scale defines whether a product is perceived to have a high or low capability to evoke emotions, whereas the other scale defines whether the product is perceived to have a high or low capability to support the user in his goal fulfilment. Both scales are assumed to be independent of each other. Products that are perceived rather low on both scales are experienced as useless, whereas products that are perceived rather high on both scales are highly desired by the user as dual use products. This is in line with Hassenzahl (2003, p. 37) too, who uses a similar scale to classify products. Instead of the categories "Hedonic" and "Utilitarian" he categorizes products as "SELF" and "ACT" products depending on the combination of hedonic and pragmatic product characteristics. The product character is the combination of the product's perceived manifestations on both scales (see Figure 1). Additionally, the perceived product character is subjective and therefore does heavily depend on the individual

who rates the product (cf. Chesney, 2006). Therefore, the decision whether a product is perceived to be hedonic or utilitarian or dual depends on the user and his current task.

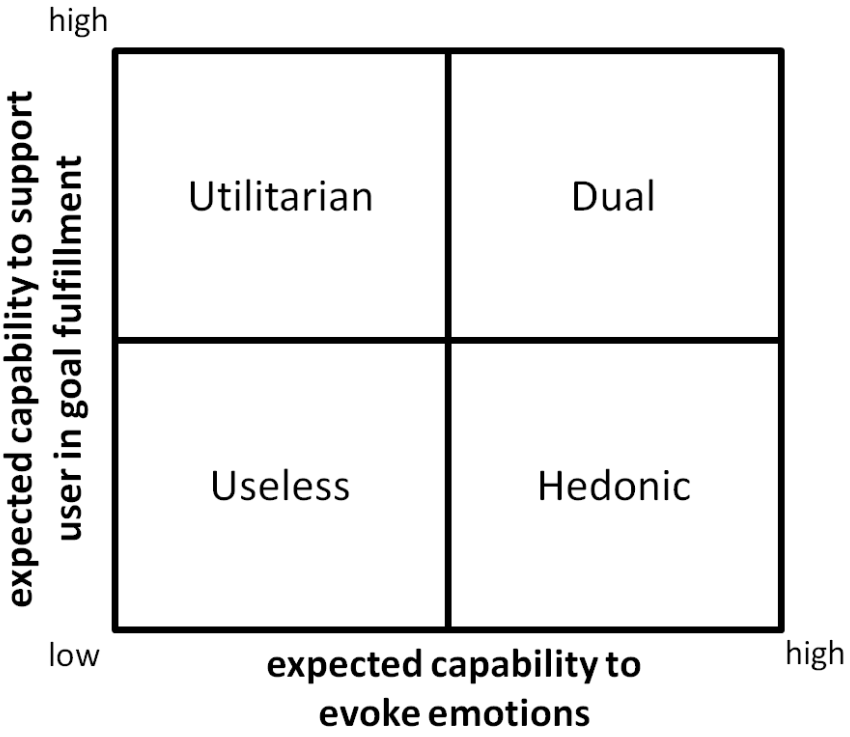


Figure 1: Two dimensional scale for the classification of products according to the usage mode (Kauer, Theuerling & Bruder, in print) inspired by Chesney (2006) and Hassenzahl (2003).

This thesis focuses on the explanation and prediction of technology acceptance of hedonic and dual use products. To be able to explain and predict technology acceptance, the term technology acceptance has to be defined. Within the next section existing definitions of technology acceptance will be investigated due to their applicability to hedonic and dual use products and an appropriate definition will be chosen or a new definition will be deduced.

2.2 Technology Acceptance

The focus of this thesis is to develop a model that is able to explain and predict technology acceptance of hedonic and dual use products better than existing models. But before deducing a technology acceptance model it is necessary to define what technology acceptance means in the context of hedonic and dual use products.

Although some of the models in this research area are called technology acceptance models, no clear definition of technology acceptance is used in literature (cf. DeLone & McLean, 1992). Instead of defining technology acceptance, the respective meaning of tech-

nology acceptance has to be deduced from its operational definition in literature. Overall, in research two operational definitions of technology acceptance are used: 1. the actual usage of a system (e.g. Davis, 1989) or 2. the intention to use a system (e.g. Venkatesh & Davis, 2000, Tzou & Lu, 2009, Heijden, 2004). In neither case, the construct technology acceptance is explicitly defined. In the first case, technology acceptance is considered to have a direct impact on the usage duration and it is assumed that the longer a product is used the higher the acceptance of the product is. In the later operational definition, it is assumed that technology acceptance has a direct impact on the consciously-made decision to use a product in the future. The higher the acceptance of a product is, the stronger is the intention to use this product. However, in the context of hedonic and dual use products, both definitions are problematic either due to the underlying theoretical assumptions or due to their practical application. Those problems will be discussed in the following paragraphs. Afterwards, an explicit definition of technology acceptance will be given, which is seen to be more appropriate for hedonic and dual use products than the implicit definitions derived from the existing operational definitions.

Taking actual usage as measure for technology acceptance is problematic for several reasons. The potential use cases for the model are restricted. To be able to distinguish between low levels of technology acceptance and other external reasons (e.g. financial conditions) for low usage rates, only cases can be reasonable considered in which the technology was provided by a third party. Then, a low usage rate would probably indicate a low acceptance. Still, this is not necessarily true, because of another problem of this operational definition: especially in the context of hedonic and dual use products usage durations could be considerably reduced by other activities that are perceived to be more binding (e.g. spending time with the family; joining training sessions in a sports club etc.). Therefore, the absolute usage duration is not a meaningful indicator of technology acceptance, especially, if the remaining usage of a hedonic or dual use product would be considered as very enjoyable and valuable by the user. Then, low usage durations would not necessary account for a low acceptance of the product. In contrast, differences between intended usage duration (e.g. just playing with a video console for a quarter of an hour) and real usage durations (e.g. playing for an hour because it was so much fun) can be valuable for assessing the technology acceptance. In the case of hedonic and dual products it can be assumed that prolonged usage is an indication of technology acceptance (cf. Chesney, 2006). But this would require measuring intended usage durations as well as actual usage durations, which leads to another criticism of this measure: the considera-

tion of usage duration requires time. One of the aims of technology acceptance is to prevent expensive undesirable endeavours by providing a judgement of acceptance in advance. Because usage durations need a working prototype or product which can be used over a longer period of time that is not investigated by an experimenter, a prediction of technology acceptance would be problematic with this operational definition and thereby reduce the applicability of the model (cf. Kauer et al, in print). Summarizing, it can be said that usage durations may be an appropriate measure in contexts were the technology is already available to all users and no other obligations prevent usage. But for the prediction and explanation of technology acceptance of hedonic and dual use products another measure has to be found.

The second definition – technology acceptance as usage intention – is more easily applicable to the context of hedonic and dual use products, because it does not require long-term observations. But the exclusively use of intention as sole criteria is a very narrow definition which mirrors only a small part of technology acceptance. As earlier studies were able to show, a usage intention can be formed, if the prospective user believes that someone important to him expects him to use a certain product (cf. e.g. Rawstorne , Jayasuriya and Caputi, 2000; Venkatesh & Brown, 2001; Shin, 2009). This meeting of expectations would not necessarily lead to acceptance of the product. It can be assumed that if those external expectations are omitted, the product would not further be used by the user. Therefore, intention to use a product is a part of technology acceptance but is not sufficient to define acceptance.

The Cambridge Online dictionary (http://dictionary.cambridge.org/) refers to acceptance as "general agreement that something is satisfactory or right, or that someone should be included in a group", which leads to an addition of approval and thereby voluntariness to the definition of acceptance. Considering the restrictions of applied definitions for technology acceptance, a combined measure for technology acceptance will be used within the context of this thesis. It is assumed that technology acceptance is determined by two parts: the approval of the technology and the intention to use it. Hence, for this work the definition of Dethloff (2004, translation of the author) is followed, who wrote "acceptance goes beyond sole acquiescence and toleration and is characterized not only by appreciation (attitude), but by the willingness to take action, too." This leads to the following definition of technology acceptance for this thesis:

> *Technology acceptance is the positive attitude towards a certain technology in combination with the intention to use this technology.*

(cf. Kauer et al., in print)

After defining technology acceptance for this thesis, the next step is to identify the most promising model to be adapted to the context of hedonic and dual use products. Therefore, within the next sections different models will be introduced that aim to explain technology acceptance. However, it must be noted that those models do not use the new definition of technology acceptance. Therefore, the dependent variable will be explicitly mentioned for each model.

2.3 Models to explain Technology Acceptance

The origin of technology acceptance research can be found during the 1980s where first IT systems were regularly integrated into the working process of many decision makers. Companies have spent a lot of money to reorganize their working processes by integrating information technology to improve their efficiency, but sometimes, people who would benefit from it were not willing to use a newly introduced system (Nickerson, 1981). First explorative studies concentrated on functionality, accessibility-availability, start-stop hassle, system dynamics and response time, work-session interrupts, training and user aids, documentation, command languages, consistency and integration, user conceptualization of system, and a miscellany of other factors to explain the missing acceptance (Nickerson, 1981). From there on, the development of models to predict user acceptance of information technology rose rapidly. One of the first general models which were applied to explain the dissemination of technology was the Innovation Diffusion Theory by Rogers (1962).

2.3.1 Innovation Diffusion Theory (Rogers, 1962; 2003)

A widely known theory which is concerned with the use of technology is the Innovation Diffusion Theory (Rogers, 1962). In March 2012 Google scholar counted almost 40000 citations for the book “The diffusion of Innovation” of Rogers. The theory discusses the process of the adoption of technological innovations. According to Rogers (2003), diffusion consists of multiple elements: the existence of an innovation. This existence has to be communicated. This communication happens over a period of time. It is communicated within a social system. The theory gives the framework for explaining the dissemination of technologies within a social system. It is distinguished between three main-types of innovation decisions: 1. Optional innovation-decisions (an individual decides independent from its social system), 2. collective innovations-decisions (a consensual decision among the members of a social

system), and 3. authority innovation-decisions (decision that are made by individuals that possess power, status, or technical expertise).

This theory is very useful for the investigation of groups, but has only a small focus on the explanation of individual adoption decisions (optional innovation-decisions). Aside from that, technology is seen as "a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving the desired outcome" (Rogers, 2003, p. 35), which is a very outcome-oriented perspective. The same accounts for the definition of adoption that is seen as "a decision to make full use of an innovation as the best course of action available" (Rogers, 2003, p. 171). Because the main focus of this thesis is the investigation of hedonic and dual use products, which do have at least a partial focus on usage that is not outcome-oriented, the innovation diffusion theory is not further considered.

2.3.2 Technology-to-Performance Chain (Goodhue & Thompson, 1995)

In 1995 Goodhue and Thompson developed the Technology-to-Performance-Chain. Within this chain, two streams of researched were combined: the utilization focus stream and the task-technology fit focus research. The utilization focus research highlights the aspects that lead to higher utilization of technologies, which is, at least implicitly, though to increase performance (cf. Goodhue & Thompson, 1995, p. 214). The task-technology fit focus research concentrates on the correspondence of technology functionality and task requirements. It is assumed that only technology that "provides features and support that 'fit' the requirements of a task" (Goodhue & Thompson, 1995, p. 214) will lead to an increased performance. The main statement of the Technology-to-Performance Chain is that "to have a positive impact on individual performance, the technology must be utilized, and the technology must be a good fit with the tasks it supports" (Goodhue & Thompson, 1995, p. 213).

The model of Goodhue and Thompson (1995) highlights some interesting aspects about the utilization of technologies for task fulfillment. The main aspect is the fit of the technology for the task which has to be performed. This idea is also reflected by other authors who stress the importance of the task (e.g. Moon & Kim, 2001). Therefore, the fit of product character and task will be discussed later on within this chapter. Still, the main focus of the Technology-to-Performance Chain lies in the explanation of performance benefits which are the results of higher utilization and good task-technology fit. Because this thesis focuses on the explanation of acceptance of hedonic and dual use products, neither tasks nor performance

are in the focus of investigation. Therefore, the benefit of the Technology-to-performance Chain for this work is restricted and it will not be further considered within this work.

2.3.3 Theory of Reasoned Action (Fishbein & Ajzen, 1975)

The Theory of Reasoned Action (TRA, Fishbein & Ajzen, 1975) is a psychological theory that aims at explaining consciously intended behaviour. The theory assumes that the performance of a specific behaviour is determined by the behavioural intention to perform the behaviour. Behavioural intention is determined by the attitude towards the behaviour and the subjective norm concerning the behaviour. The relative influence of attitude and subjective norm on behavioural intention is estimated by regression. The subjective norm is defined as "the person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Fishbein & Ajzen, 1975, p. 302). The attitude towards behaviour is determined by the multiplication of the salient beliefs about the consequences of performing the behaviour and the evaluation of the consequences.

The Theory of Reasoned Action is a widely known theory that was applied to multiple fields of research (cf. Davis et al., 1989). Still, it is a general model and does "not specify the beliefs that are operative for a particular behavior" (Davis et al., 1989, p. 984). Therefore, the applicability for the prediction of behaviour in the context of computer usage is restricted. Davis (1985, Davis et al. 1989) developed a technology acceptance model on the basis of this theory. Because adaptations to the field of technology exist, the original Theory of Reasoned Action will not be further considered for this thesis.

2.3.4 Technology Acceptance Model by Davis (1985; Davis et al. 1989)

The Technology Acceptance Model (TAM; Davis, 1985) was developed with the goal in mind to focus on the use of end-user systems, which are "defined as systems that are directly used by organizational members at their own discretion to support their work activities" (Davis, 1985, p. 9). Until then, mostly performance criterions were considered when choosing between different design solutions but this did not lead to considerable increase in system usage. Davis (1985) attributed this to the lack of acceptance of the end-user systems and developed a model which aims to explain why a system is used or not. For this purpose, he grounded his model on the Theory of Reasoned Action (Fishbein & Ajzen, 1975) and adapted it to the use of end-user systems.

As the starting point for the model the *system characteristics* were chosen. Davis hypothesizes that the *system characteristics* lead to an appraisal of *perceived usefulness* and *perceived ease of use* of the system. *Perceived usefulness* is defined as "the prospective user's subjective probability that using a specific application system will increase his or her job performance within an organizational context" (Davis et al., 1989, p.985*). Perceived ease of use* is seen as "the degree to which the prospective user expects the target system to be free of effort" (Davis et al., 1989, p. 985). Additionally, *perceived ease of use* influences perceived usefulness because "other things being equal, the easier the system is to use, the more useful it can be" (Venkatesh & Davis, 2000, p. 187). All three variables – the *system characteristics, perceived usefulness,* and *perceived ease of use* of a system – lead to an *attitude* toward using such a system. This *attitude* leads to a behavioural *intention to use* the system. The combination of *perceived usefulness* and behavioural *intention to use* the system can be used to predict the *actual usage* of a system. Figure 2 shows the Technology Acceptance Model. Overall, TAM explains about 40% variance in usage intentions and behaviour (Venkatesh & Davis, 2000) and thereby performs favourably in comparison to other models (Venkatesh, 1999) and is one of the most successful models even though its power is limited (Sun & Zhang, 2006). Still, the main focus of TAM is the explanation of the acceptance of end-user systems in an organizational context. In its first version, only constructs relevant in a working context were integrated into the model, which reduces the applicability for the explanation of hedonic and dual use products. As defined earlier, hedonic products are mainly used due to their expected capability to evoke emotions during product usage. This aspect is not covered by TAM at all. Because TAM has become one of the most cited models for technology acceptance it has undergone diverse modifications (e.g. Davis et al. 1992, Venkatesh & Davis, 2000; Moon & Kim, 2001; Hejden, 2004; Chesney, 2006; Venkatesh & Bala, 2008). Some of those modifications will be presented in the following sections.

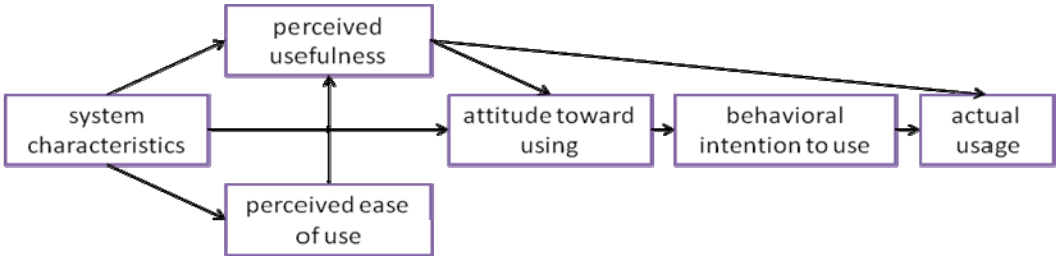


Figure 2: Technology Acceptance Model by Davis (1985) and Davis et al. (1989).

2.3.5 Technology Acceptance Model 2 (Venkatesh & Davis, 2000)

Within TAM 2, Venkatesh and Davis (2000) stated that *perceived usefulness* performed as good predictor in numerous studies and therefore, "it is important to understand the determinants of this construct" (Venkatesh & Davis, 2000, p.187). They included additional theoretical constructs on social influence processes (*subjective norm, voluntariness,* and *image*) and cognitive instrumental processes (*job relevance, output quality, result demonstrability,* and *perceived ease of use*). The model can be seen in Figure 3.

The definition of *subjective norm* is derived from the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975, p.302). It says that *subjective norm* is a "person's perception that most people who are important to him think he should or should not perform the behaviour in question." It is included into TAM 2 as direct determinant of *intention to use* as well as for *perceived usefulness* and *image*. It is believed that *subjective norm* plays a role in mandatory settings, but not in voluntary settings, therefore, voluntariness ("the extent to which potential adopters perceive the adoption decision to be non-mandatory"; Venkatesh & Davis, 2000, p. 188) was integrated as moderating factor into the model. Additionally, the effect of *subjective norm* is believed to be diminishing with increasing experience with the system, because users are better able to evaluate the system on their own (p.190).

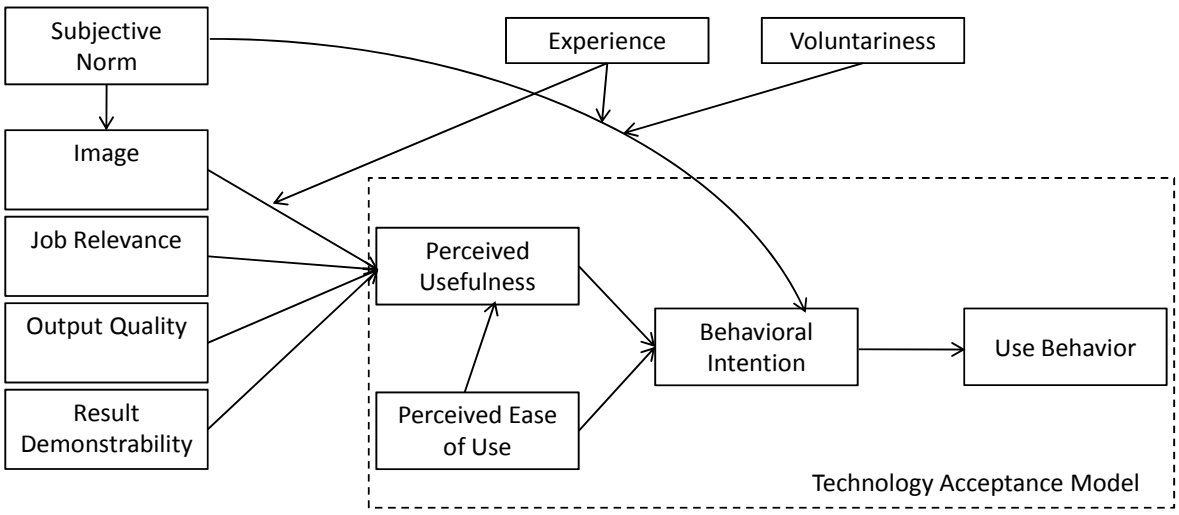


Figure 3: Technology Acceptance Model 2 with a focus on determinants of perceived usefulness (Venkatesh & Davis, 2000).

Another social factor integrated into TAM 2 is "image", which is defined as "the degree to which use of an innovation is perceived to enhance one's [...] status in one's social system" (Venkatesh & Davis, 2000, p.189). Within this view, *image* is used as source for ref-

erent power which leads to greater productivity. Therefore, *image* is assumed to have a direct positive effect on *perceived usefulness* of a system.

In addition to the social influence processes some cognitive instrumental processes are assumed to be determinants of *perceived usefulness*. Venkatesh and Davis (2000) state that "people form perceived usefulness judgements in part by cognitively comparing what a system is capable of doing with what they need to get done in their jobs" (p.190). Derived from different theoretical developments (action theory, work motivation theory, and behavioural decision theory) they theorize that "people use a mental representation for assessing the match between important work goals and the consequences of performing the act of using a system as a basis of forming judgements about the use-performance contingency (e.g. *perceived usefulness*)" (Venkatesh & Davis, 2000, p.191). One of those cognitive instrumental processes is the judgement on *job relevance* ("the individuals perception regarding the degree to which the target system is applicable to his or her job", Venkatesh & Davis, 2000, p.191). *Job relevance* is believed to have a positive direct impact on *perceived usefulness*. In other words: if a system is not capable of performing tasks that are relevant for the job the system is not perceived to be useful.

Furthermore, the *output quality* is seen as determinant of *perceived usefulness*. *Output quality* means that people consider how well the relevant tasks are performed by the system (Venkatesh & Davis, 2000, p.191). Earlier studies were able to show the impact of *output quality* on *perceived usefulness* (Davis et al. 1992) and therefore, this connection is integrated into TAM 2, too.

The last cognitive instrumental process that influences *perceived usefulness* is the *result demonstrability*, which means that the user is able to attribute the gain in performance to the use of the system (Venkatesh & Davis, 2000, p. 192). This means that even if a system leads to an increased performance but the user is not able to understand the source of the increase the system will not perceived to be useful.

TAM 2 still has a clear focus on explaining technology acceptance in an organizational context. The model succeeds in identifying relevant determinants of *perceived usefulness* and thereby helps to improve the development of useful end-user systems. But, no variable was added to the model which helps to predict the acceptance of hedonic and dual use products better than TAM already did. The addition of *subjective norm* and *image* can be seen as social factors that might be relevant for hedonic systems, but the definitions restrict the

applicability to a performance context were power is relevant for productivity. Furthermore, it is admitted that *subjective norm* is only relevant for mandatory settings. For hedonic and dual use products it is assumed that the use is mostly voluntary. This leads to the assumption that TAM 2 is as appropriate as TAM 1 for the explanation of technology acceptance of hedonic and dual use products. Because TAM 2 integrates more – for the herein researched context irrelevant – variables than TAM 1, TAM 1 is considered to have a higher economic efficiency (same explanatory power with less variables) and is therefore preferred over TAM 2. As further development of TAM 2 Venkatesh et al. (2003) developed the "Unified Theory of Acceptance and Use of Technology" (UTAUT).

2.3.6 Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003)

In 2003 Venkatesh et al. addressed the problem that due to the high number of models that aim to explain technology acceptance researchers have to generate their own model by choosing between the existing constructs or choosing between the models directly and thereby ignore contributions of other models (cf. p.426). They compared 8 existing approaches and deduced their "Unified Theory of Acceptance and Use of Technology" from the results. Within their work they state that "[...] the theoretical models to be included in the present review, comparison, and synthesis employ intention and/or usage as the key dependent variable. The goal here is to understand usage as a dependent variable" (Venkatesh et al., 2003; p.427). Furthermore, Venkatesh et al. (2003) note that prior studies focused on simple, individual-oriented information technologies, whereas their study focuses on complex and sophisticated organizational technologies used for managerial concerns (cf. p. 427). Additionally, they consider mandatory as well as voluntary implementation contexts, because the mandatory implementations "are possibly of more interest to practicing managers" (Venkatesh et al. 2003, p. 437). Their results – explained variance of usage up 70 % - support the UTAUT model. Therefore, it can be said that Venkatesh et al. (2003) succeeded in developing a model that is able to predict usage behaviour within organizational settings better than earlier models.

Due to the clear focus on explanation of usage behaviour of complex systems in organizational contexts, UTAUT does not meet the main area of interest of this thesis and therefore will not be further considered for this thesis. Mainly the restrictions to an organizational context as well as the explicit consideration of mandatory settings do not fit the theoretical framework for the acceptance of hedonic and dual use products. Additionally, the model is far less parsimonious than TAM and its modifications (Raaij & Schepers, 2008) and the numer-

ous impact factors are seen as step towards chaos where "knowledge is becoming increasingly fragmented with little coherent integration" (Bagozzi, 2007, p. 245).

2.3.7 Technology Acceptance Model 3 (Venkatesh & Bala, 2008)

The Technology Acceptance Model 3 (Venkatesh & Bala, 2008) is a combination of TAM 2 (Chapter 2.3.5) and the model of determinants of *perceived ease of use* (Venkatesh, 2000). Venkatesh (2000) identified 6 factors that influence the *perceived ease of use* of an information system. Four of them are categorized as anchors and two are categorized as adjustment factors. Those anchors and adjustment factors are similar to the ones considered in the *technology acceptance* section.

The anchor factors are *computer self-efficacy*, *perception of external control*, *computer anxiety*, and *computer playfulness*. *Computer self-efficacy* is defined "the degree to which an individual believes that he or she has the ability to perform a specific task/job using the computer" (Compeau & Higgings, 1995a, 1995b, cited according to Venkatesh & Bala 2008, p.279). The *perception of external control* is defined as "the degree to which an individual believes that organizational and technical resources exist to support the use of the system" (Venkatesh et al. 2003, cited according to Venkatesh & Bala 2008, p.279). "The degree of 'an individual's apprehension, or even fear, when he/she is faced with the possibility of using computers'" is called *computer anxiety* (Venkatesh, 2000, p.349). The last anchor factor is *computer playfulness* which can be seen as "the degree of cognitive spontaneity in microcomputer interaction" (Webster & Martocchio, 1992, cited according to Venkatesh & Bala 2008, p.279).

The two adjustment factors are *perceived enjoyment* and *objective usability*. They are used to adjust the initial *perceived ease of use* rating after first experiences with the system. *Perceived enjoyment* can be seen as "the extent to which 'the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use'" (Venkatesh, 2000, p.351). The *objective usability* is "a 'comparison of systems based on the actual level (rather than perception) of effort required to completing specific tasks'" (Venkatesh, 2000, pp.350-351).

According to Venkatesh and Bala (2008) the effects of *computer anxiety, computer playfulness, perceived enjoyment,* and *objective usability* are moderated by the experience of the user. The complete model can be seen in Figure 4.

Overall, the TAM 3 succeeds in combining two theoretical approaches that aim to explain and predict technology acceptance of information systems in a working context and therefore, the working context remains the focus of this model. This can be seen, when looking at the model extensions. The advantage of TAM 3 (Venkatesh & Bala, 2008) over TAM 2 (Venkatesh & Davis, 2000) is the addition of determinants for *perceived ease of use*. But the authors of the model still assume that *perceived ease of use* and *perceived usefulness* are the only direct impact factors on *intention to use*. Because other authors (e.g. Moon & Kim, 2001; Heijden, 2004; Chesney, 2006; Tzou & Lu, 2009) were able to increase the predictive power of TAM by integrating additional factors for the investigation of hedonic or dual use products it can be assumed that those two factors are not the main predictors – or at least not the only relevant predictors - for the acceptance of hedonic and dual use products. Therefore, it is expected that TAM 3 (Venkatesh & Bala, 2008) is not able to increase the explanatory power of TAM (Davis, 1989) for hedonic and dual use products. Therefore, the original TAM (Davis, 1989) is kept due to economical reasons.

Additionally, the integration of *perceived enjoyment* is valuable for the explanation of technology acceptance of hedonic systems, because it stresses the emotional side of product usage. According to the definition of hedonic products reached in the introduction (Products that "are used due to their expected capability to evoke positive – or negative – emotions, independent of any utilitarian outcomes of the product usage"), this is one of the main aspects of hedonic products. Thereby, a hedonic product that is able to evoke emotions should be more accepted than a product that is not able to evoke emotions. Within TAM 3 (Venkatesh & Bala, 2008) *perceived enjoyment* is added as determinant of *perceived ease of use*. Within this thesis, it is expected that *perceived enjoyment* has a direct positive effect on technology acceptance of hedonic systems. This assumption is shared by Davis et al. (1992), who integrated *perceived enjoyment* as direct impact factor on technology acceptance into their extended TAM which will be presented in the next section.

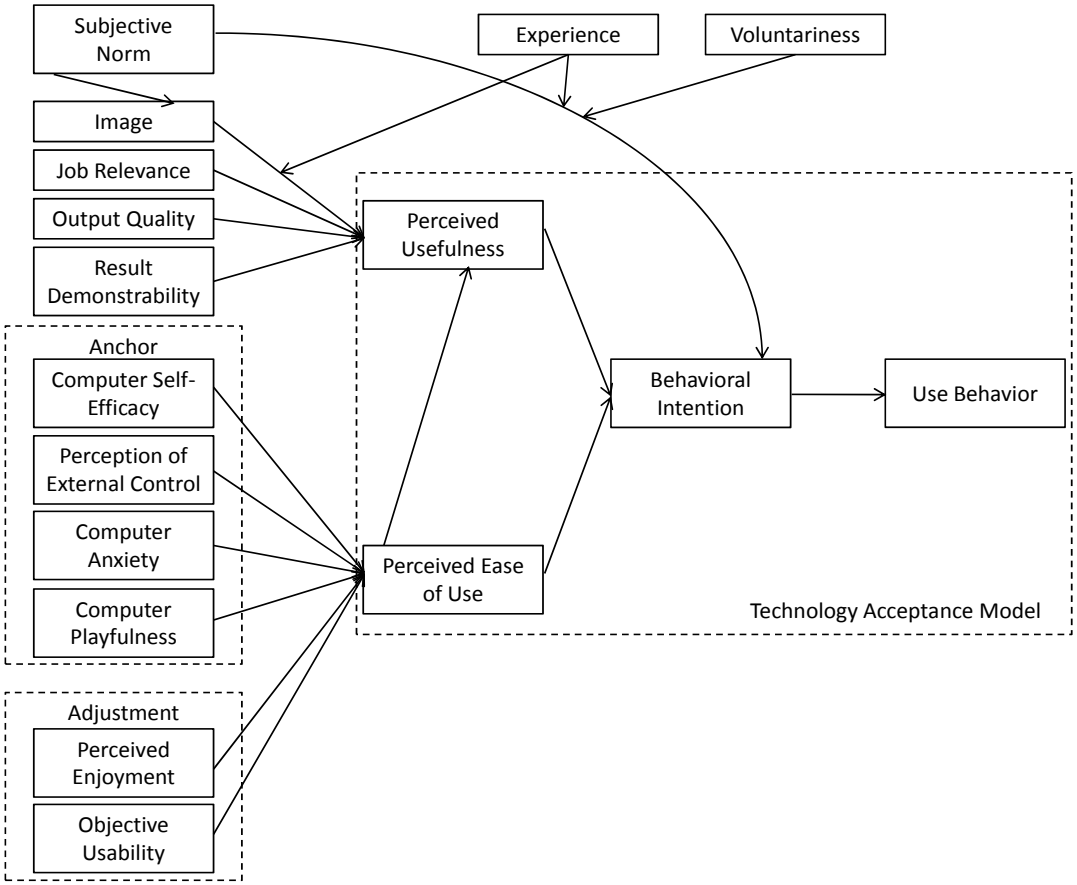


Figure 4: Technology Acceptance Model 3 by Venkatesh and Bala (2008).

2.3.8 Extended Technology Acceptance Modell (Davis, Bargozzi, and Warshaw, 1992)

In 1992 Davis et al. raised the question whether individuals use computers because of the enhancement in productivity or because of the enjoyment it brings to them. Inspired by computer game research, they proposed an extended version of the original Technology Acceptance Model (Davis, 1989) that integrated *perceived enjoyment* as direct impact factor on *intention to use*. Because Davis et al. (1992) still focussed their research on the explanation of information technology systems in the workplace, they also integrated *output quality* and *task importance* into their model. It is believed that *output quality* and *perceived ease of use* are determinants of *perceived usefulness* and *perceived enjoyment*. Additionally, the effect of *output quality* and *perceived ease of use* on *perceived usefulness* should be moderated by the importance of the task. *Output quality* is the quality, which can be observed if looking at the "intermediate or end products of using the system" (Davis et al. 1992, p.1115), whereas *task importance* is seen as the degree to which the by the system supported task is important for the individuals job performance (cf. Davis et al. 1992, p. 1115). The complete extended TAM can be seen in Figure 5.

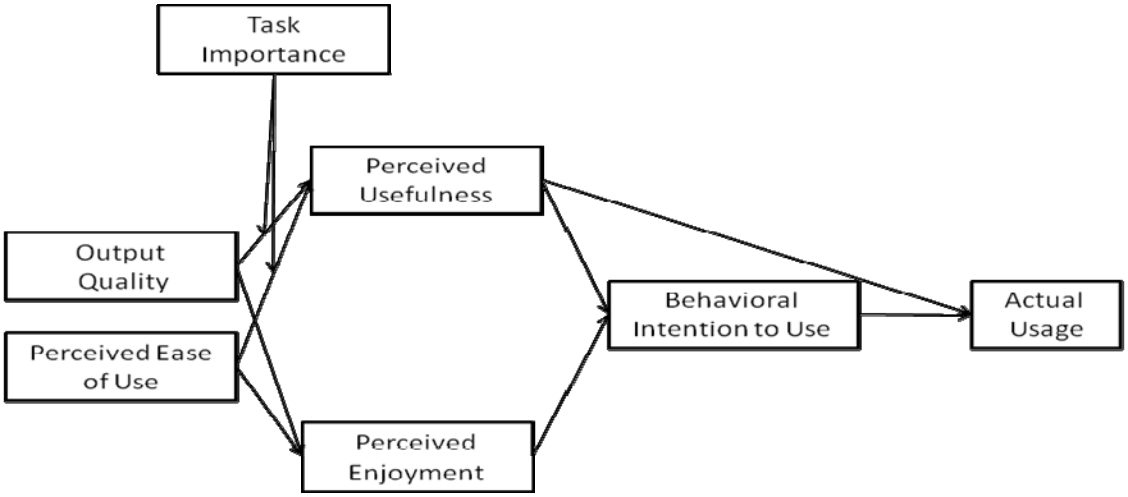


Figure 5: Extended TAM by Davis et al. (1992).

Within their studies, Davis et al. (1992) found *perceived usefulness* to be four to five times as important as *perceived enjoyment* for the determination of *intention to use* (cf. p. 1124). Considering the object of both studies being workplace-related information systems, (word processor usage and business graphics software usage) it can be assumed that the impact of *perceived enjoyment* on the acceptance of hedonic systems would be even greater. This assumption was investigated by Heijden (2004) and Chesney (2006) who used a simplified version of the extended TAM for their studies.

2.3.9 Revised Technology Acceptance Model (Heijden, 2004; Chesney, 2006)

Within his work, Heijden (2004) establishes a valuable distinction for the field of technology acceptance research. Inspired by consumer behaviour research, he distinguishes the relevant determinants for acceptance between the task characters (hedonic vs. utilitarian) instead of distinguishing between the areas in which a product is used (e.g. workplace vs. home) (cf. P. 696f). During literature reviews Heijden (2004) found contradictory results for the role of *perceived ease of use* that can be explained when considering the task character and therefore argues for a strict distinction between hedonic and utilitarian tasks (p. 697). Within his work, Heijden (2004) uses a revised version of TAM which includes only the factors *perceived ease of use*, *perceived usefulness* and *perceived enjoyment* as direct impact factors on *intention to use*. Furthermore, *perceived ease of use* is assumed to influence *perceived usefulness* and *perceived enjoyment* (see Figure 6). In contrast to TAM, TAM 2 and TAM 3 the revised TAM uses the *intention to use* instead of the actual usage as measure for technology acceptance.

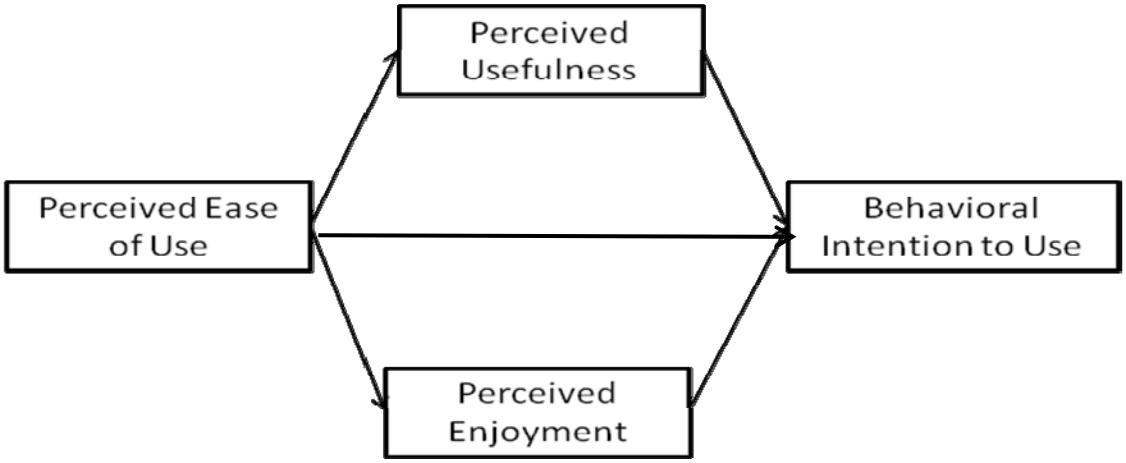


Figure 6: Revised TAM by Heijden (2004).

Heijden (2004) was able to show that for hedonic systems the impact of *perceived enjoyment* on *intention to use* is as high as the impact of *perceived ease of use* on *intention to use*. Both factors predict twice the amount of variance of *intention to use* than *perceived usefulness*.

The revised TAM by Heijden is used in a study of Chesney (2006), too, who tests the model for the explanation of acceptance of dual use products. Within his paper he proposes a shift from the one-dimensional categorisation of tasks on the dimension hedonic-utilitarian as suggested by Heijden (2004) to a two-dimensional approach of task nature (see Figure 1). As described in the section on "Product Character", this approach is applied for this thesis, too. In his work Chesney (2006) investigated the revised TAM for a dual use product (Lego Mindstorms^{TM}) and found perceived usefulness to be the most important predictor of intention to use, followed by perceived enjoyment.

In sum, Heijden (2004) found a quite economic model, which increased the explanatory power of TAM (Davis, 1989) for hedonic systems remarkably. Chesney (2006) was able to show that *perceived enjoyment* is also important for predicting the acceptance of dual use products. The revised TAM included an overall number of three determinants, which were all contributing significantly to the explanation of intention to use for hedonic as well as for utilitarian systems. Another important contribution of Heijden (2004) and Chesney (2006) is the identification of the usage task as relevant impact factor on technology acceptance. Therefore, the revised TAM by Heijden (2004) and the two-dimensional classification of usage will be used as basis for the development and evaluation of a technology acceptance model for hedonic and dual use products. Due to the fact, that the overall explained variance of the model (35% in the study of Heijden, 2004) is still restricted, it can be assumed that for the explanation of acceptance of hedonic systems a consideration of additional factors is necessary.

2.3.10 Recapitulation

This chapter started with the definition of the product character and defined hedonic, dual use and utilitarian products. Afterwards, technology acceptance was defined as combination of positive attitude towards a product and intention to use this product. An overview over different technology acceptance models followed and each model was judged according to its applicability to hedonic and dual use products. A comparison of the models showed that for the explanation of technology acceptance of hedonic and dual use products the revised TAM (Heijden, 2004, Chesney, 2006) is the most promising approach. Due to the low overall explanatory power for the model it seems necessary to extent the model with additional factors, which were shown to be relevant in the context of hedonic and dual use products. Those factors will be considered within the next section.

2.4 Positive Emotions during Product Usage

In the context of hedonic systems, positive emotions during product usage become a desirable goal, since the aim of hedonic systems is to provide self-fulfilling value to the user (Heijden 2004). In this view, it is necessary to examine what leads to positive emotions during product usage.

Tiger (1992) analysed the origin of pleasure in general. Within his work Tiger discusses different sources of pleasure (e.g. food and sexuality) and argues that those activities are pleasurable due to the evolutionary benefits they bring (p. 23 ff). Furthermore, he argues that even if those behaviour patterns were favourable in the past (e.g. a preference for sweets and fats) they must not be favourable today (e.g. high preference for sugar and fat paired with high availability of sugar and fat leads to increased consume which in turn leads to weight gain). But due to the long duration in which those preferences are developed, the current living style has almost no influence on evolutionary preferences (p.23). Overall, Tiger (1992) categorises pleasure in four different classes: physiopleasure, sociopleasure, psychopleasure, and ideopleasure. According to Tiger physiopleasure is the most obvious pleasure and includes “the sensory experiences involving the sexual organs, and the sensation of taste and smell that derive from foods, drinks, and perfumes [...]. There are also more general physical impressions [...]” (Tiger, 1992, p. 53f). So for physiopleasure there needs to be a physical sensation, even if it might be not the only kind of sensation associated (e.g. kissing includes not only the physical aspects but also the fantasies involved). The second category, sociopleasure, emerges from “the fun people have when they are with other people” (Tiger 1992,

p.53). Tiger argues that sociopleasure is very common and therefore underestimated in its value because it is almost always available. Furthermore, he sees sociopleasure as one of the prerequisites of morality (e.g. fear of social rejection due to the non-compliance to common rules). In contrast, psychopleasure is a pleasure that normally is derived "from activities initiated and carried forward by individual people. Someone who accomplishes even a mundane task, such as mowing a lawn [...] is finding satisfaction in the act and in using the skill, energy, and resources to complete it" (Tiger, 1992, p. 56). Even though psychopleasure "depends on the existence of other people and on the real world", it is more independently motivated and enjoyed than the two preceding categories of pleasure. The last category of pleasure – the ideopleasure – can be seen as "mental, aesthetic, often intensively private" (Tiger, 1992, p.59). It is derived "from experiencing or creating theoretical entities such as movies, buildings, plays, music, art objects, books" (Tiger, 1992, p. 59). There are some restrictions to the work of Tiger, which makes them not easy applicable to the case of hedonic and dual use products. Even though these patterns are a first categorisation of pleasure, they are not well defined and do overlap at some instances. Tiger himself describes the categories as "loose" (p. 59) and "imperfect" (p.54). Furthermore, the categories are very general and do not closer specify what is necessary to evoke this pleasures in the interaction with technical systems. To be able to integrate the pleasures in a reasonable way, it has to be further described what leads to pleasure. Because Tiger (1992, p.23ff) argues that activities are pleasurable due to the evolutionary benefit they bring, those pleasures may be seen as favourable behaviour patterns in an evolutionary sense and are therefore advantageous. If those behaviours are seen as advantageous, it can be assumed that they are somehow related to human needs. Needs can be seen as the driving force of human behaviour which enables the holistic personal development (cf. Maslow, 1943) and they are therefore likely to promote advantageous behaviour. This leads to the assumption that the fulfilment of needs should lead to pleasure. Deci and Ryan (2000) state that "human needs specify the necessary conditions for psychological health or well-being and their satisfaction is thus hypothesised to be associated with the most effective functioning" (p. 229). Needs can be seen as "particular qualities of experience that all people require to thrive" (Baumeister & Leary, 1995, p. 325). Different researchers assume that satisfied needs promote well-being and therefore lead to positive emotions (Baumeister & Leary, 1995; Deci & Ryan, 2000). Referring back to the evolutionary approach of Tiger (1992) on pleasure this means that pleasure is derived from the satisfaction of relevant human needs. Related to the intend to develop a model, which is able to predict and explain the acceptance of hedonic and dual use products it is fundamental to investigate which needs lead to positive

emotions (because it is assumed that hedonic products are used due to their capacity to evoke emotions).

One of the most famous approaches to classify needs was undertaken by Maslow (1943, 1954). In his theoretical approach Maslow distinguishes between physiological needs (including hunger, sleep, and sex), safety needs (strive for physical safety), love needs (includes love, affection, and belongingness), esteem needs (strive for strength, achievement, independence, freedom, reputation and prestige), and the need for self-actualisation (the desire to meet one owns potential). In Maslow's view "basic human needs are organised into a hierarchy of relative prepotency" (1942, p. 375). This means that physiological needs (such as food and sleep) are more important and a non-fulfilment of those needs is more disturbing than that of safety or social needs. In Moslow's words is the organism "then dominated by the physiological needs" (1942, p.373). Since the introduction of Maslow's needs hierarchy, several other needs have been proposed (cf. Sheldon et al., 2001), which also have to be considered.

Sheldon and colleagues (2001) investigated which needs are the most salient for human beings and found support for a generalised approach to needs. This means that the positive affect a person's experiences, by the fulfilment of a certain need, is not influenced by the conscious rating of the importance of that need (p.330). Sheldon et al. (2001) investigated 10 candidate needs: autonomy, competence, relatedness, self-actualisation, physical thriving, pleasure-stimulation, money-luxury, security, self-esteem and popularity-influence. Within their studies they identified four needs that are very salient when thinking about satisfying events and do have a strong impact on positive emotions. Those needs were: autonomy, competence, relatedness and self-esteem (p.329f). According to Sheldon et al. (2001, p. 326) it can be said that "people want to feel effective in their activities (competence), to feel that their activities are self-chosen and self-endorsed (autonomy), and to feel a sense of closeness with some others (relatedness)." The last relevant need - self-esteems – "refers to a more global evaluation of the self" (Sheldon et al. 2001, p. 326). Even though this evaluation of needs is valuable to better understand human behaviour it is not yet related to the use of technology.

An investigation of needs according to their relevance to the use of technology was completed by Hassenzahl, Diefenbach and Göritz (2010), who also considered the findings of Sheldon et al. (2001). Within their studies they investigated seven needs: competence, relatedness, popularity, stimulation, meaning, security, and autonomy. Self-esteem was explicitly excluded "because it could be understood rather as an outcome of need fulfilment than a need

in itself. [...] For example, self-esteem can result from fulfilled competence" (Hassenzahl et al. 2010, p. 355). Out of the remaining seven needs, three needs were identified as the most salient ones in the context of positive experience with interactive products: relatedness, stimulation and competence. This is in line with the hedonic-pragmatic model of user experience in which Hassenzahl (2007) distinguishes between hedonic ("refers to the product's perceived ability to support the achievement of so-called 'be-goals', such as 'being competent', 'being related to others', 'being special'", Hassenzahl 2007, p. 10) and pragmatic quality ("refers to the product's perceived ability to support the achievement of 'do-goals'" (Hassenzahl, 2007, p.10) "and is akin to a broad understanding of usability..:", Hassenzahl et al. 2010, p. 357). According to Hassenzahl and colleagues (Hassenzahl, Diefenbach & Göring, 2010; Hassenzahl 2003; 2007) hedonic qualities can be further divided into three different facets: "'Stimulation' (novelty and change, personal growth), 'identification' (communication of identity to relevant others, relatedness), and 'evocation' (provoking memories, symbolizing)" (e.g. Hassenzahl, 2007, p.10). Within his more recent works Hassenzahl (Hassenzahl & Monk, 2010) reduces the hedonic qualities to *identification* and *stimulation*. Considering the definition of stimulation as consisting of two parts namely "novelty and change" and "the strive for personal growth" it can be assumed that *stimulation* meets the needs competence as well as stimulation. Earlier studies were able to show that people strive for personal development (e.g. White, 1959; Bandura, 1997; Atkinson, 1964; Sheldon et al., 2001). This development can be fostered by a product's ability to evoke curiosity and thereby exploration (Malone, 1981; Hassenzahl, 2005). This exploration may lead to the discovery of new functionalities and fields of applications and thereby increasing the user's competence. Combining those facets, *stimulation* is defined as the extent to which the product usage leads to the perception of novelty and curiosity and thereby supports the user in his strive for competence. By contrast, *identification* can be assumed to meet the need for relatedness (Baumeister & Leary, 1995). According to Belk (1988, p. 139) "we regard possessions as part of ourselves". He states further that "that we are what we have [...] is perhaps the most basic and powerful fact of consumer behaviour" and this assumptions was often confirmed in consumer research (e.g. Prentice 1987, Walker & Olson 1991, Dittmar, 1991; Govers & Mugge 2004, Dittmar 2004), which makes *identification* a strong possible predictor for acceptance of technical products. According to Tzou and Lu (2009) "the possessions that are socially visible, expensive, and generally personalised are more likely to reflect consumer's self" (p.312). According to Gordon (1968; cited by Krampen, 2002) the self can be described with the help of multiple aspects. This can be a physical description ("I have blue eyes"), a geographical ("I live in

Darmstadt"), a social ("I am a friend of .../I have two sisters"), a status description ("I am leader of...") or a psychological description. This psychological description can include attitudes ("I think that.../I like...") and traits ("I am an outgoing person") among other things. Therefore, one relevant aspect of *identification* might be the expression of personal values. An example of this would be the consumption of "fair trade" products, because they are clearly bought due to the personal value they reflect (in this case e.g. reducing poverty). Even if values may be considered as part of the self they are named explicitly because some of the main prerequisites for the expression of self (visible, expensive, and personalised) may not be relevant in the context of products that represent values. This might be especially true for the personalisation aspect. Therefore, *identification* is defined for this thesis as the extent to which a product supports the expression of the self and one's own values (based on Walker & Olson 1991; Hassenzahl 2003). In contrast to the construct "social norm" *identification* is a seen as a voluntary decision to use certain products to display parts of the self and values. In the case of social norm it can be expected that products that are purely used because somebody else expects someone to use a product will be abandoned as soon as this expectation changes. Because *stimulation* and *identification* were found to be relevant for positive emotions as well in a general context (cf. Sheldon et al. 2001) as in a technology related context (cf. Hassenzahl et al. 2010), they are chosen to be included in the research model.

2.4.1 Recapitulation

Within this section the origin of pleasure as result of the fulfilment of human needs was considered. Derived from a study of Hassenzahl, Diefenbach, and Göring (2010) this led to the identification of the most salient human needs in the context of positive product experiences: relatedness, competence and stimulation. Thus, the hedonic-pragmatic model of user experience (Hassenzahl, 2007) was chosen for the extension of the revised TAM (Heijden, 2004) and stimulation and identification were defined for the context of dual use and hedonic products. An open point remains the importance of the task a user performs, which was stressed by several authors (e.g. Chesney, 2006). Therefore, the next section (Chapter 2.5) will consider the usage task and deduce relevant implications for the application of the research model.

2.5 Role of the usage task

Within many of the presented models in this chapter, the authors stress the importance of the product character (e.g. Heijden, 2004) or the task a user fulfils (e.g. Chesney, 2006) for the prediction and explanation of technology acceptance. They argue that the importance of impact factors on technology acceptance depends on the product or respectively on the task a user performs with the product. In earlier works, Hassenzahl (e.g. 2003) introduces the idea of usage modes. Those modes determine the relative importance of product qualities in dependency of the task a user wants to perform. Thereby, the usage modes combine both aspects – product character and task character – and enables a simplified consideration of both aspects. The product character is seen as two-dimensional construct which is derived from a combination of hedonic and pragmatic product attributes. The same idea was adopted by Chesney (2006, see Figure 1). Only the wording is slightly different: utilitarian products are act products, hedonic products are self products, dual products are desired products and unwanted products are termed useless. The usage situation is integrated because it "combines the perceived product character with a particular set of aspirations" (Hassenzahl, 2003, p. 39). He concludes that "obviously, these situations can be quite diverse, which poses a serious problem for predicting emotional reactions or appealingness in particular usage situations" (p. 39). Hassenzahl (2003) overcomes that problem by focussing "on the mental state of the user by defining different usage modes" (p. 39). Overall, it is distinguished between two usage modes: action and goal mode. In each mode, usage is seen to consist of behavioural goals and action to fulfill these goals. In goal mode the goal is of a certain importance to the user and the product is seen as "means to an end". The user tries to reach the goal as effective and efficient as possible. It can be assumed, that in goal mode the pragmatic qualities of a product are more relevant than the hedonic qualities. In contrast, during "action mode the action is in the fore [… and] determines goals 'on the fly'" (p.40). Those goals are more volantile than goals in goal mode and may change rapidly during the usage of the product. According to Hassenzahl (2003, p. 40) "individuals describe themselves as 'playful' and 'spontanous'". It can be assumed that hedonic qualities are more important in action mode than in goal mode. Overall, it the perception of a product character is not identical with the appraisal of the product as "good" or "bad", but that the match of product character and usage mode lead to a satisfying usage experience (Hassenzahl, 2005). Therefore, it is essential to consider the usage mode if predicting the users acceptance of technical products.

In later works, Hassenzahl, Diefenbach and Göring (2010) also stress the variability of impact factors but argue with a division of needs into motivators and hygiene factors (Herzberg, Mausner, & Sneiderman,. 1959, Kano et al. 1984). This division into two scales, one that reaches from bad to neutral and one that reaches from neutral to good, is also common in other areas like seating comfort (Zhang, Helander & Drury, 1996). In their view, a motivator represents "the product's perceived ability to create positive experiences through need fulfilment" (Hassenzahl et al. 2010, p.361). Following this thought, a product is perceived to be hedonic, if it fulfils the user's needs and thereby a positive affect is experienced, which is then attributed to the product. Therefore, hedonic qualities can be seen as "need fulfilment attributed to the product" (Hassenzahl et al. 2010, p.361). Hedonic qualities are then seen as motivators. In contrast, hygiene factors are "enabling the fulfilment of needs through removing barriers" (Hassenzahl et al. 2010, p. 361). Pragmatic qualities are hygiene factors. Within this assumption, hedonic qualities are sources of pleasure whereas pragmatic qualities, if fulfilled, are not source of pleasure themselves. The factors *perceived ease of use* and *perceived usefulness* from the Technology Acceptance Model (Davis 1989) can be seen as hygiene factors (compare Hoonhout & Stienstra 2003) whereas *perceived enjoyment*, and *identification*, and *stimulation* can be seen as motivators.

Summarising, it can be said that for the prediction of technology acceptance the consideration of product character and usage situation is important, because impact factors may vary between different products and situations. This consideration can be done by integrating the usage mode into the validation process of the research model. Additionally, the consideration of motivators and hygiene factors should lead to different results for the importance of the impact factors on technology acceptance between different product characters. The research model and the hypotheses will be presented within the next chapter (Chapter 3). This chapter closes with a short summary of all considerations.

2.6 Summary

Within this chapter the term technology acceptance was defined as "positive attitude towards a certain technology in combination with the intention to use the technology". This was done, because up until now, no clear and explicit definition exists within the research of technology acceptance, but despites this, until now it had to be deduced from the operational definitions. Additionally, technology acceptance was often measured in the organisational settings and therefore, it was assumed that the operational definitions would not be applicable

to the context of hedonic and dual use products. The new definition of *technology acceptance* has to be validated within empirical studies.

Starting with this definition of technology acceptance, different models were considered that aim to explain and predict technology acceptance. All models were examined with respect to their applicability to hedonic and dual use products. The revised TAM by Heijden (2004) and Chesney (2006) was identified to be the most promising model. Still, the model explained relatively little variance in former studies, which led to the conclusion that an extension of the model has to be found. This extension should be especially valuable for the prediction and explanation of *technology acceptance* for hedonic and dual use products.

Therefore, a consideration of relevant factors for evoking positive emotions followed within the next section. The fulfilment of human needs was identified as the basis for positive emotions (cf. Maslow, 1947; Shelden et al., 2001; Hassenzahl, Diefenbach & Göring, 2010). This led to the selection of competence, stimulation, and relatedness as most important needs, which will therefore be integrated into the revised TAM (Heijden, 2004; Chesney, 2006). The resulting model and the relationship between the constructs have to be defined and validated within this thesis. Additionally, it remains open if the integration of *identification* and *stimulation* actually adds explanatory power to the revised TAM (Heijden, 2004; Chesney, 2006). This has to be tested, too.

Furthermore, the importance of product character and usage mode was highlighted within this chapter. This is essential to predict changes of the importance of the impact factors between different product characters and usage situations. The usage modes (Hassenzahl, 2003) were chosen as adequate implementation of both aspects. Within this thesis, product character as well as usage mode are considered for predicting and explaining *technology acceptance*. By now, it is not clear how the explanatory power of the research model (further on called Balanced TAM because it considers pragmatic as well as hedonic qualities) varies between different product characters and usage modes. This has to be hypothesised and evaluated within this thesis.

Additionally, the idea of hygiene factors and motivators (Hassenzahl, Diefenbach, and Göring, 2010) was presented and the implementations for the research model shortly discussed. One part of the empirical investigation will be to investigate whether pragmatic qualities are really hygiene factors in the context of hedonic and dual use products.

The next chapter (Chapter 3) starts with the presentation of the research model – the Balanced TAM – and the explanation of the interrelations between the constructs. Afterwards, all research hypotheses will be introduced and operational defined.

3 Research Model and Hypothesis

This chapter's scope is to combine the findings of the last chapter to a research model and deduce the research hypothesis from theory. First, the research model will be presented and the connections between the single constructs will be defined. Afterwards, the influence of the usage mode and the hygiene factor/motivator theory will be discussed and predictions of technology acceptance for hedonic and dual use products in both usage modes will be deduced.

3.1 Research Model: Balanced Technology Acceptance Model

In the Chapter 2 of this thesis the revised TAM (Heijden, 2004; Chesney, 2006) and the hedonic/pragmatic model of user experience (Hassenzahl, 2007) with the factors *identification* and *stimulation* were identified as promising combination for the explanation of technology acceptance of hedonic and dual use products. Now, both theories will be combined and the research model will be deduced. The resulting model can be seen in Figure 7. The model is called Balanced Technology Acceptance Model (Balanced TAM) because it includes hedonic as well as pragmatic qualities (cf. Kauer, Theuerling, and Bruder, in print).

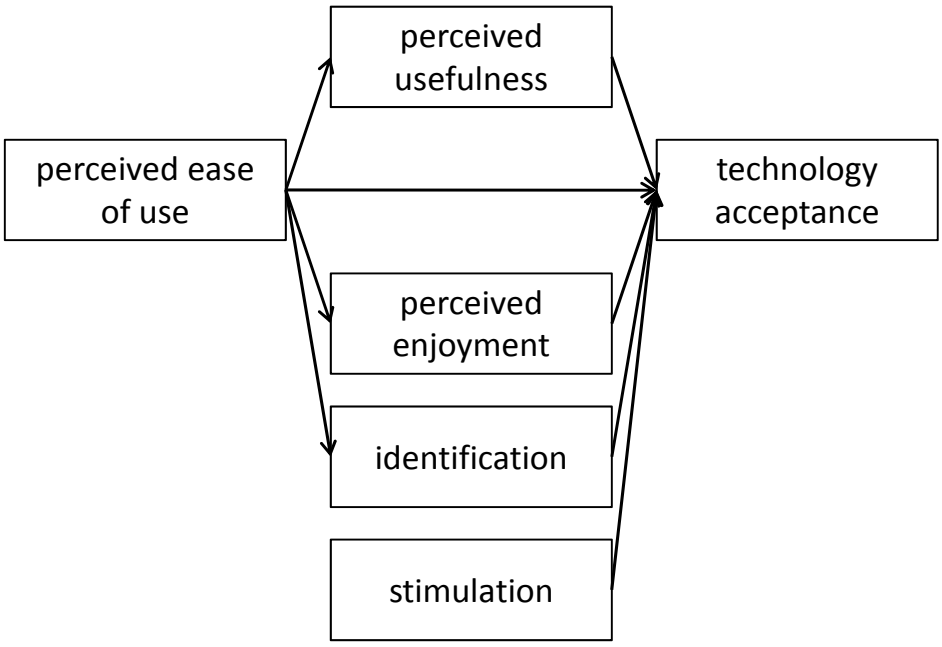


Figure 7: Balanced TAM (cf. Kauer et al., in print) derived from Heijden (2004), Chesney (2006) and Hassenzahl (2003, 2006).

It is assumed that the traditional and well verified TAM relationships remain the same within the Balanced TAM. Therefore it is assumed that *perceived ease of use* positively influ-

ences the *perceived usefulness* of a product, because the easier a product is the more useful it can be (see e.g. Davis, Bargozzi & Warshaw, 1989). Additionally, *perceived ease of use* and *perceived usefulness* are assumed to have a direct positive impact on *technology acceptance*. In accordance to Davis et al (1992), Heijden (2004) and Chesney (2006) it is assumed that *perceived ease of use* positively influences *perceived enjoyment* and that *perceived enjoyment* positively influences *technology acceptance. Identification* and *stimulation* are both assumed to have a positive direct impact on *technology acceptance,* whereby *identification* itself ought to be influenced positively by *perceived ease of use.* This influence goes back to a statement of McClelland (1951, cited by Belk, 1988, p. 140) who says that "external objects become part of the self when we are able to exercise power or control over them". Following this assumption it is expected that *perceived ease of use* (as part of controllability) partially determines the perceived extent of *identification* and that the easier a product can be used the more *identification* it allows (cf. Kauer, Theuerling & Bruder, in print).

The strength of the impact of each construct is assumed to vary according to a) the product character and b) the usage mode. It is assumed that for utilitarian products the pragmatic qualities are more relevant for *technology acceptance* (see Figure 8) and that for hedonic products the hedonic qualities are more relevant for *technology acceptance* (see Figure 9).

For dual use products all factors are supposed to be relevant (see Figure 7), whereas the strength of the impact depends on the usage mode. It is assumed that in goal mode pragmatic qualities are more influential, whereas in action mode hedonic qualities ought to be more influential. The formal hypotheses will be deduced in the next section (3.2).

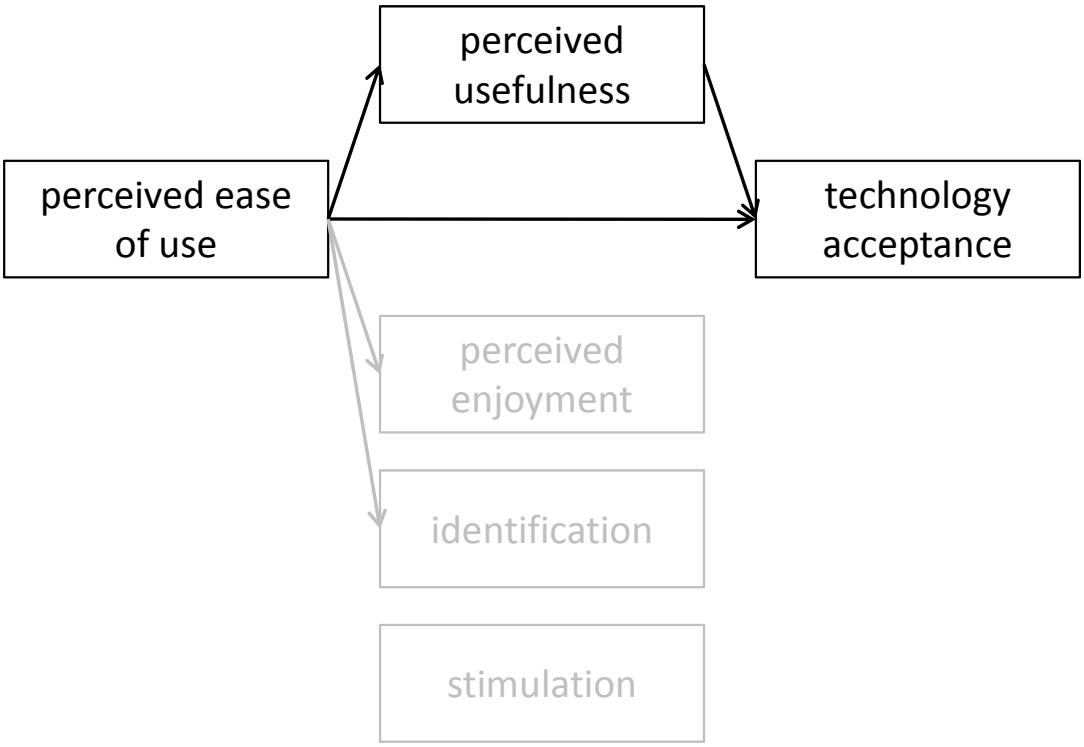


Figure 8: Balanced TAM for utilitarian products.

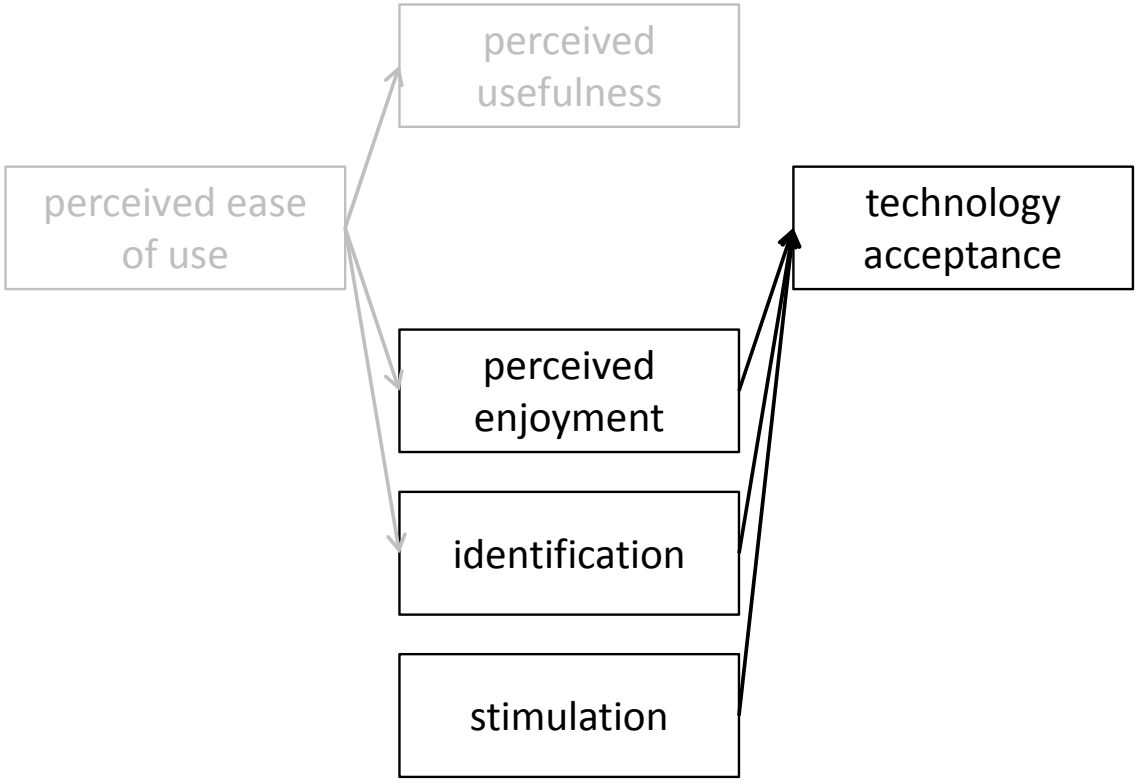


Figure 9: Balanced TAM for hedonic products.

3.2 Hypotheses

A number of hypotheses derive from the theory, from the redefinition of existing constructs and from the Balanced TAM. In order to reflect the theoretical assumptions the hypotheses will be divided into different groups. First, some general hypotheses will be stated that deal with general aspects of technology acceptance. Those are followed by hypotheses that are concerned with product character and usage mode. In the last section of this section interactions between product character and usage mode are hypothesised.

3.2.1 General hypotheses

The general hypotheses are explicit assumptions, which refer to the used constructs and the explanatory power of the model under different circumstances. The first hypothesis reflects the above met definition of technology acceptance, according to which *technology acceptance* can be seen as combination of positive *attitude* and *intention to use* a product (cf. Kauer et al., in print). It is assumed that:

Hypothesis 1: *Intention to use* and *attitude towards usage* can be integrated to an overlying measure of *technology acceptance*.

This assumption is operational defined as follows:

$H0_{1\text{-}1}$: combined Cronbach's α of *intention to use* and *attitude towards usage* ≤ .7

$H1_{1\text{-}1}$: combined Cronbach's α of *intention to use* and *attitude towards usage* > .7

and

$H0_{1\text{-}2}$: I*ntention to use* and *attitude towards usage* load on different factors in a factor analyses

$H1_{1\text{-}2}$: I*ntention to use* and *attitude towards usage* load on one factor in a factor analyses

The Balanced TAM was developed to integrate findings of consumer research into the context of technology acceptance. The special focus of Balanced TAM lies on the prediction and explanation of technology acceptance for hedonic and dual use products. Because Balanced TAM integrates factors that were shown to have a positive impact on the experience with interactive products (cf. Hassenzahl et al. 2010) it should be better suited for the explana-

tion and prediction of *technology acceptance* of hedonic and dual use products than existing models. Therefore, it is assumed that:

Hypotheses 2: Balanced TAM has a higher explanatory power than revised TAM for hedonic and dual use products with:

Hypothesis 2a: Balanced TAM has a higher explanatory power for technology acceptance than revised TAM for hedonic products.

This assumption is operational defined as follows:

$H0_{2a}$: adjusted R^2 for *technology acceptance* of Balanced TAM ≤ adjusted R^2 for *technology acceptance* of revised TAM for hedonic products

$H1_{2a}$: adjusted R^2 for *technology acceptance* of Balanced TAM > adjusted R^2 for *technology acceptance* of revised TAM for hedonic products and

Hypothesis 2b: Balanced TAM has a higher explanatory power for technology acceptance than revised TAM for dual use products.

This assumption is operational defined as follows:

$H0_{2b}$: adjusted R^2 for *technology acceptance* of Balanced TAM ≤ adjusted R^2 for *technology acceptance* of revised TAM for dual use products

$H1_{2b}$: adjusted R^2 for *technology acceptance* of Balanced TAM > adjusted R^2 for *technology acceptance* of revised TAM for dual use products.

As mentioned above, Balanced TAM is seen as especially suitable for the explanation and prediction of technology acceptance of hedonic and dual use products. According to different authors (e.g. Chesney, 2006; Hassenzahl, 2003; Goodhue & Thompson, 1995) the acceptance of a product differs between tasks and between usage modes. Because given tasks are seen as a part of the goal mode, only differences between the usage modes are considered. Additionally, it is assumed that the explanatory power of Balanced TAM varies between different product characters. Because the model was optimised for hedonic products, its explanatory value should decrease for utilitarian products. Therefore, it is assumed that:

Hypothesis 3: The explanatory power of Balanced TAM differs between different product characters and different usage modes with:

Hypothesis 3a: The explanatory power of Balanced TAM being best for hedonic products in action mode.

This assumption is operational defined as follows:

$H0_{3a}$: adjusted R^2 for *technology acceptance* of Balanced TAM for hedonic products in action mode ≤ adjusted R^2 for *technology acceptance* of Balanced TAM for action and goal mode of dual use products and utilitarian products, and for hedonic products in goal mode

$H1_{3a}$: adjusted R^2 for *technology acceptance* of Balanced TAM for hedonic products in action mode > adjusted R^2 for *technology acceptance* of Balanced TAM for action and goal mode of dual use products and utilitarian products, and for hedonic products in goal mode and

Hypothesis 3b: The explanatory power of Balanced TAM being the poorest for mainly utilitarian products in goal mode.

This assumption is operational defined as follows:

$H0_{3b}$: adjusted R^2 for *technology acceptance* of Balanced TAM for utilitarian products in goal mode ≥ adjusted R^2 for *technology acceptance* of Balanced TAM for action and goal mode of hedonic and dual use products, and for utilitarian products in action mode

$H1_{3b}$: adjusted R^2 for *technology acceptance* of Balanced TAM for utilitarian products in goal mode < adjusted R^2 for *technology acceptance* of Balanced TAM for action and goal mode of hedonic and dual use products, and for utilitarian products in action mode.

Existing technology acceptance models worked well for organisational contexts but failed to explain variance in other contexts. This might again be due to a lack of fit between task and product (cf. Goodgue & Thompson, 1995) or to an absence of relevant impact factors for the new contexts. (cf. Davis, Bagozzi, & Warshaw, 1992; Moon & Kim, 2001; Heijden, 2004; Klopping & McKinney, 2004; Brunar II & Kumar, 2005; Chesney, 2006; Tzou & Lu, 2009; Ha & Stoel, 2009; Shin, 2009 for a few examples of adoptions). According to Chesney

(2006), most products can be regarded as dual use products and the rating whether a product is perceived to be hedonic, utilitarian, or dual depends heavily on the individual. Within this thesis, it is assumed that the acceptance of products that are mostly categorised as either hedonic or utilitarian depending mainly on the product character. By contrast, products that are mainly categorised as dual should be more strongly affected by the usage mode. This leads to the assumption that:

Hypothesis 4: Product character and usage mode influence which factors determine *technology acceptance* with:

Hypothesis 4a: Product character being more important for the determination of influencing factors on *technology acceptance* for extreme product characters (easily categorised as either utilitarian or hedonic) than the usage mode.

This assumption is operational defined as follows:

$H0_{4a}$: impact factors on *technology acceptance* for hedonic and utilitarian products in action mode ≠ impact factors on *technology acceptance* for hedonic and utilitarian products in goal mode

$H1_{4a}$: impact factors on *technology acceptance* for hedonic and utilitarian products in action mode = impact factors on *technology acceptance* for hedonic and utilitarian products in goal mode and

Hypothesis 4b: Usage mode being more important for the determination of influencing factors on technology acceptance for dual use products than the product character.

This assumption is operational defined as follows:

$H0_{4b}$: impact factors on *technology acceptance* for dual use products in action mode = impact factors on *technology acceptance* for dual use products in goal mode

$H1_{4b}$: impact factors on technology acceptance dual use products in action mode ≠ impact factors on *technology acceptance* for dual use products in goal mode.

Besides the general hypothesis, an investigation of the influence of product character on the explanatory power of the Balance TAM is interesting. The according assumptions are presented within the next section (3.2.2).

3.2.2 Hypotheses for Product Character

Within this section, hypotheses are presented which refer to the product character. The Technology Acceptance Model (Davis et al. 1989) was validated numerous times for pragmatic goals with utilitarian products (cf. Mathieson, 1991; Rawstorne, Jayasuriya, & Caputi, 2000, Legris, Ingham, & Collerette, 2003). Often, *perceived usefulness* turned out to be the strongest predictor for acceptance (e.g. Davis, 1993; Igbaria, Schiffman, & Wieckowski, 1994; Legris, Ingham, & Collerette, 2003; King & He, 2006), followed by *perceived ease of use.* In a first step, it is assumed that:

Hypothesis 5: The explanatory power of pragmatic qualities ("Perceived Ease of Use" and "Perceived Usefulness") depends on the product character with:

Hypothesis 5a: *perceived usefulness* being the most important predictor of *technology acceptance* for utilitarian products.

This assumption is operational defined as follows:

$H0_{5a}$: standardised β-weights of *perceived usefulness* ≤ standardised β-weights of *perceived ease of use*, *perceived enjoyment*, *identification,* and *stimulation* for utilitarian products

$H1_{5a}$: standardised β-weights of *perceived usefulness* > standardised β-weights of *perceived ease of use*, *perceived enjoyment*, *identification,* and *stimulation* for utilitarian products and

Hypothesis 5b: Perceived Ease of Use being the second most important predictor of technology acceptance for utilitarian products.

This assumption is operational defined as follows:

$H0_{5b\text{-}1}$: standardised β-weights of *perceived ease of use* ≥ standardised β-weights of *perceived usefulness* for utilitarian products

$H1_{5b\text{-}1}$: standardised β-weights of *perceived ease of use* < standardised β-weights of *perceived usefulness* for utilitarian products

and

$H0_{5b\text{-}2}$: standardised β-weights of *perceived ease of use* ≤ standardised β-weights of *perceived enjoyment*, *identification,* and *stimulation* for utilitarian products

$H1_{5b\text{-}2}$: standardised β-weights of *perceived ease of use* > standardised β-weights of *perceived enjoyment*, *identification,* and *stimulation* for utilitarian products and

Following the argument of Hassenzahl and colleagues (2010), it has to be assumed that pragmatic qualities are hygiene factors for the usage of hedonic products. Therefore, their influence on acceptance should disappear as soon as they are rated as sufficient by the users. It is assumed that:

Hypothesis 5c: After reaching a medium level pragmatic qualities are having no further influence on technology acceptance for hedonic products (hygiene factor).

This assumption is operational defined as follows:

$H0_{5c\text{-}1a}$: $p \leq .05$ for standardised β-weights of *perceived usefulness* for *perceived usefulness* ratings of ≥ *3.5* on *technology acceptance*

$H1_{5c\text{-}1a}$: $p > .05$ for standardised β-weights of *perceived usefulness* for *perceived usefulness* ratings of ≥ *3.5* on *technology acceptance*

or

$H0_{5c\text{-}1b}$: $p \leq .05$ for a positive standardised β-weights or $p > .05$ for standardised β-weights of *perceived usefulness* for *perceived usefulness* ratings of < *3.5* on *technology acceptance*

$H1_{5c\text{-}1b}$: $p \leq .05$ for a negative standardised β-weight of *perceived usefulness* for *perceived usefulness* ratings of < *3.5* on *technology acceptance*

and

$H0_{5c\text{-}2a}$: $p \leq .05$ for standardised β-weights of *perceived ease of use* for *perceived ease of use* ratings of ≥ *3.5* on *technology acceptance*

$H1_{5c\text{-}2a}$: $p > .05$ for standardised β-weights of *perceived ease of use* for *perceived ease of use* ratings of ≥ *3.5* on *technology acceptance.*

or

$H0_{5c\text{-}2b}$: $p \leq .05$ for a positive standardised β-weights or $p > .05$ for standardised β-weights of *perceived ease of use* for *perceived ease of use* ratings of < *3.5* on *technology acceptance*

$H1_{5c\text{-}2b}$: $p \leq .05$ for a negative standardised β-weight of *perceived ease of use* for *perceived ease of use* ratings of < *3.5* on *technology acceptance*

In consumer research *identification* was found to be a strong influence factor on the acceptance of products (e.g. Belk, 1988; Dittmar, 2004). Transferring this to hedonic products, this should make *identification* a strong predictor of *technology acceptance. Perceived enjoyment* was found to be a relevant predictor, too, but is assumed to have a smaller impact than *identification,* because the amount of explained variance was often restricted (e.g. Davis et al., 1992; Koufaris, 2002; Chesney, 2006). Because no empirical data on *stimulation* within the *technology acceptance* is known, *stimulation* is assumed to have the smallest impact on *technology acceptance.* It is assumed that:

Hypothesis 6: The explanatory power of hedonic qualities (*perceived enjoyment*, *identification*, and *stimulation*) depends on the product character with:

Hypotheses 6a: *identification* being the most important predictor of *technology acceptance* for hedonic products,

This assumption is operational defined as follows:

$H0_{6a}$: standardised β-weight of *identification* ≤ standardised β-weights of *perceived usefulness, perceived ease of use*, *perceived enjoyment*, and *stimulation* for hedonic products

$H1_{6a}$: standardised β-weight of *identification* > standardised β-weights of *perceived usefulness, perceived ease of use*, *perceived enjoyment*, and *stimulation* for hedonic products and

Hypothesis 6b: *perceived enjoyment* being the second most important predictor of *technology acceptance* for hedonic products.

This assumption is operational defined as follows:

$H0_{6b\text{-}1}$: standardised β-weight of *perceived enjoyment* ≥ standardised β-weight of *identification* for hedonic products

$H1_{6b\text{-}1}$: standardised β-weight of *perceived enjoyment* < standardised β-weight of *identification* for hedonic products

and

$H0_{6b\text{-}2}$: standardised β-weight of *perceived enjoyment* ≤ standardised β-weights of *perceived ease of use, perceived usefulness,* and *stimulation* for hedonic products

$H1_{6b\text{-}2}$: standardised β-weight of *perceived enjoyment* > standardised β-weights of *perceived ease of use, perceived usefulness,* and *stimulation* for hedonic products and

Hypothesis 6c: Perceived Stimulation being a better predictor of technology acceptance than pragmatic qualities for hedonic products.

This assumption is operational defined as follows:

$H0_{6c}$: standardised β-weight of *stimulation* ≤ standardised β-weights of *perceived usefulness* and *perceived ease of use* for hedonic products

$H1_{6c}$: standardised β-weight of *stimulation* > standardised β-weights of *perceived usefulness* and *perceived ease of use* for hedonic products.

It is assumed that *technology acceptance* depends on the combination of product character and usage mode. Therefore, after presenting the hypotheses for product character, the next section is concerned with the hypotheses for the usage modes.

3.2.3 Hypotheses for Usage Modes

Due to the specific foci of users in different usage modes and in line with earlier research findings (e.g. Hassenzahl, 2003), it can be assumed that:

Hypothesis 7: The explanatory power of the hedonic and pragmatic qualities depends on the usage mode with:

Hypothesis 7a: Hedonic qualities being more important in action mode.

This assumption is operational defined as follows:

$H0_{7a}$: added standardised β-weights of *identification, stimulation,* and *perceived enjoyment* in action mode ≤ added standardised β-weights of *identification, stimulation,* and *perceived enjoyment* in goal mode

$H1_{7a}$: added standardised β-weights of *identification, stimulation,* and *perceived enjoyment* in action mode > added standardised β-weights of *identification, stimulation,* and *perceived enjoyment* in goal mode and

Hypothesis 7b: Pragmatic qualities being more important in goal mode.

This assumption is operational defined as follows:

$H0_{7b}$: added standardised β-weights of *perceived usefulness* and *perceived ease of use* in goal mode ≤ added standardised β-weights of *perceived usefulness* and *perceived ease of use* in action mode

$H1_{7b}$: added standardised β-weights of *perceived usefulness* and *perceived ease of use* in goal mode > added standardised β-weights of *perceived usefulness* and *perceived ease of use* in action mode.

Up to here, the explanatory power of Balanced TAM for single manifestations of product character and usage mode was hypothesised. Within the next section, specific interactions between product character and usage mode will be considered.

3.2.4 Product Character and Usage Modes

Even though it is assumed that the group of dual use products is the biggest group of technical products, the influence of hedonic and pragmatic qualities on the acceptance of those products is not as clear as for utilitarian or hedonic products. Therefore, an interaction of product character and usage mode is assumed. It is stated that:

Hypothesis 8: For dual use products whether hedonic or pragmatic qualities have stronger explanatory power depends on the usage mode, with:

Hypothesis 8a: Hedonic qualities being the most important predictors of technology acceptance for dual use products in action mode

This assumption is operational defined as follows:

$H0_{8a}$: added standardised β-weights of *perceived enjoyment, identification, and stimulation* for dual use products in action mode ≤ added standardised β-weights of *perceived usefulness* and *perceived ease of use* of dual use products in action mode

$H1_{8a}$: added standardised β-weights of *perceived enjoyment, identification, and stimulation* for dual use products in action mode > added standardised β-weights of *perceived usefulness* and *perceived ease of use* of dual use products in action mode and

Hypothesis 8b: Pragmatic qualities being the most important predictors of technology acceptance for dual use products in goal mode.

This assumption is operational defined as follows:

$H0_{8b}$: added standardised β-weights of *perceived usefulness and perceived ease of use* for dual use products in goal mode ≤ added standardised β-weights of *perceived enjoyment, identification, and stimulation* of dual use products in goal mode

$H1_{8b}$: added standardised β-weights of *perceived usefulness and perceived ease of use* for dual use products in goal mode > added standardised β-weights of *perceived enjoyment, identification, and stimulation* of dual use products in goal mode.

3.3 Summary

In the first section the research model of this thesis – the Balanced TAM – was deduced from revised TAM (Heijden, 2004) and from the hedonic/pragmatic model of user experience (Hassenzahl, 2007). The interrelations between the constructs were described in written form as well as in graphical form. Afterwards, the hypotheses were introduced. They were separated into general hypotheses, hypotheses concerning product character, hypotheses concerning usage mode, and those hypotheses concerning an interaction of product character and usage mode for dual use products.

To test the Balanced TAM and all research hypotheses three empirical studies were conducted. The method and results of those studies are presented and discussed in the next chapter of this thesis (Chapter 4).

4 Empirical Investigation

To test the Balanced Technology Acceptance Model and the theoretical hypothesis three studies were conducted. The first study uses a hedonic product – the Wii Motion Plus™ – as object of examination. In the second study a dual use product – the Apple iPad™ – is used and in the third study the model fit for a utilitarian product – a multi functional device that prints, copies and scans – is investigated.

In this chapter each study is described with the according results. First, a section that describes the measures and general methodological approach will introduce the methods, followed by the study sections themselves. Each study will first introduce the object of study and then proceed with the participants who attended the experiment. This is followed by the section procedure which describes the variations from the standard methodology. If appropriate, some brief information on the experimental setup is given followed by the results for each study. For the first study, the results start with an overview of internal consistency and – if possible – construct validity, followed by the textual results in the order of the hypotheses (general hypotheses, hypotheses on product character, hypotheses on usage mode and hypotheses on the interaction of product character and usage mode). The number of hypothesis addressed depends on the object of study itself and varies between the three studies. Study 2 and 3 do not again test the validity and internal consistency of the methods.

All results were calculated using the software SPSS in either version 19 or 20. According to the common labelling of results, asterisks are used to mark significant results, while 1 asterisk (*) marks the .05 level of significance, 2 asterisks (**) mark the .01 level of significance and 3 asterisks (***) mark the .001 level of significance. The result section of each study closes with a short summary. At the end of this chapter hypotheses than refer to more than one study are tested in a joint section. In Chapter 5 all results are discussed together.

Due to the fact that all three studies followed the same scheme, the according measures and the general methodology will be presented in the next section. Variations of this scheme are discussed in detail for each study.

4.1 Measure and General Methodology

To be able to validate the Balanced Technology Acceptance Model a methodological approach was developed and applied to 3 different objects of studies. On one hand, this approach consisted of the development of appropriate measures for the constructs *technology*

acceptance, perceived ease of use, perceived usefulness, perceived enjoyment, stimulation and *identification*. On the other hand, an appropriate experimental design had to be found, which integrates the usage modes into the study and enables the investigation of the importance of impact factors and the hypothesis on hygiene factors and motivators. Within the next section the development of the measures and the measures themselves will be described, followed by the general methodology in the section 4.1.2.

4.1.1 Measures

The aim of each study was to measure technology acceptance. Therefore, a questionnaire (Technology Acceptance Questionnaire: TAQ) was developed following the original TAM questionnaires. An essential task besides examining whether the extension of revised TAM to Balanced TAM adds explanatory power in the case of hedonic and dual use products was to ensure comparability to existing studies. Most of the existing studies were conducted in English speaking countries. Because all of the participants were German, all studies were conducted in German. Therefore, to ensure comparability the items from the revised TAM (Davis et al. 1992) were translated with the method of reverse translation (English version translated into German and back translated into English to check whether the original and the retranslated version are equal). The TAQ contained the primary TAM constructs, *perceived usefulness*, *perceived ease of use*, *attitude towards usage*, and *intention to use*, taken from Davis (1989) and Davis et al. (1989). Furthermore, the questionnaire was extended with the constructs *perceived enjoyment*, the hedonic qualities *stimulation* and *identification*. The items for *perceived enjoyment* were derived from the study of Davis et al. (1992, used in Heijden 2004, Chesney 2006). All items for the two hedonic qualities *stimulation* and *identification* are based upon the AttrakDiff 2™ questionnaire from Hassenzahl, Burmester, & Koller (2003). Additionally, one item ("The system meets my values") was added to reflect the expected importance of values for the perception of *identification*. To meet the requirements of hedonic and dual use products some of the translated items had to be reworded. Especially the scale perceived usefulness was not transferable due to its strong focus on productivity. All items had to be answered on a 7-point Likert scale ranging from 1 = "strongly disagree" to 7 = "strongly agree". The original AttrakDiff2™ is a semantic differential consisting of 28 bipolar items. To facilitate further studies by using only one questionnaire with one type of scale, the scales Hedonic Quality Identification and Hedonic Quality Stimulation of the AttrakDiff2™ were reworded into statements and adopted to the new definitions (e.g. "The usage of the system captivates me." instead of the semantic differential lame – captivating). To check whether

the reworded version is conforming to the original version the TAQ and the AttrakDiff2™ were used parallel during the experiments. Although the results of TAQ and AttrakDiff2™ are expected to correlate at least somehow, differences are expected due to the adjustment of the definitions and the following adjustment of the scales. Overall, the TAQ included 36 items to measure technology acceptance. After the first study, the number of items was extensively reduced to the best items of each scale. This was done by investigating the Cronbach's α of each scale and the Cronbach's α of each scale if an item is removed. The reduction resulted in a questionnaire with 23 items, which was used in all studies and which is the basis for all herein presented results. All 23 items of the final questionnaire can be seen Table 1.

Table 1: Scales and according items of the technology acceptance questionnaire. All items are answered on a 7-point Likert-scale ranging from 1 = strongly disagree to 7 = strongly agree.

Scale	Item (German)	Item (translation)
Perceived Usefulness	Das [System] erleichtert mir das Erreichen meiner Ziele.	The system supports me in reaching my goals.
	Alles in allem ist es ein ziemlich überflüssiges System.	Overall, a quite useless system.
	Ich finde, die Nutzung eines solchen Systems bringt mir Vorteile.	I find the use of such a system has advantages for me.
Perceived Ease of Use	Es fällt mir leicht zu merken, wie ich bestimmte Aufgaben mit dem [System] erledige.	It easy for me to remember how to solve certain tasks with the system.
	Die Bedienung des [System] fällt mir leicht zu lernen.	Learning to operate the multifunctional system would be easy for me. (original)
	Insgesamt finde ich das [System] einfach zu benutzen.	Overall, I find the System easy to use.
	Ich weiß zu jedem Zeitpunkt, was das [System] auf meine Befehle hin tun wird.	I always know what the system is going to do as reaction to my commands.
Perceived Enjoyment	Ich finde die Nutzung des [System] unterhaltsam.	I find using the system enjoyable. (Original, Davis et al. 1992)
	Ich finde die Nutzung des [System] spaßig.	I have fun using the system. (Original, Davis et al. 1992)
	Ich finde die Nutzung des [System] aufregend.	I find using the system exciting.
Identification	Das [System] entspricht meinen Wertvorstellungen.	The system meets my values.
	Es ist anzunehmen, dass Menschen wie ich solch ein System nutzen werden.	It is assumable that people like me use such a system.

	Ich fühle mich mit anderen [System]-Nutzern zusammengehörig.	I feel related to other system users.
	Durch die Nutzung des [System] kann ich deutlich zeigen, dass ich jemand besonderes bin.	I can demonstrate that I am special through the usage of the system.
Stimulation	Die Nutzung des [System] steigert meine Wissbegierde.	The usage of the system enhances my thirst for knowledge.
	Die Benutzung des [System] fesselt mich.	The usage of the system captivates me.
	Das [System] ist erfrischend anders als mir bekannte Systeme.	The system is refreshingly different from existing systems.
	Bei der Benutzung des [System] fühle ich mich kompetent.	During the usage of the system I feel competent.
	Durch die Benutzung des [System] habe ich wichtige Fähigkeiten erlernt.	I learned important new skills during the usage of the system.
Attitude	Ich habe eine positive Wahrnehmung von der Nutzung eines solchen Systems.	I have a positive attitude towards the usage of such a system.
	Ich finde das [System] insgesamt gut.	Overall, I find the system good.
Behavioural Intention to Use	Ich würde das [System] gerne zukünftig nutzen.	I would like the system in the future.
	Angenommen, das [System] stünde mir zu Verfügung, gehe ich davon aus, dass ich das System zukünftig regelmäßig nutzen würde.	Assumed the system would be available for me I think I would use it regularly in the future.

4.1.2 General Methodology

Each study consisted of at least 3 different parts and started with a questionnaire about personal information (age, gender, highest educational attainment, brand attachment and control believes in the context of technology (Beier, 2004)). This questionnaire was additionally used to categorise the participants into expert and novice users. For all studies, novice users were defined as users who seldom use similar technologies, whereas expert users were defined as persons who are experienced with similar technologies but not familiar with the special technology investigated in the study.

Afterwards, participants were confronted with an advertisement of the product they were going to use within the study to ensure a joint minimum level of knowledge for all participants. After viewing this advertisement, each participant was asked to answer the TAQ and

the AttrakDiff 2™ to measure the anticipated technology acceptance. This was called the pre-usage mode.

The second part of each experiment was the goal mode in which participants were instructed to fulfil given tasks as fast and as accurate as possible. The performance was measured for each participant. At the end of the goal mode, participants were asked to answer the TAQ and the AttrakDiff2™ again to enable the measuring of differences between the usage modes.

The third part was the so-called action mode. Here, each participant had the chance to explore the product without any restrictions. No time limits were given for the exploration of the product, but the experimenter was instructed to interrupt the exploration after half an hour. This time limit was reached by 2 participants in Study 2 (Apple iPad™) and therefore, their action mode was interrupted. The results of these 2 participants do not differ from those of the other participants. After exploring the system, participants were asked to answer the TAQ and the AttrakDiff2™ again.

The order of goal and action mode was permutated for each study. Therefore, 50% of all participants in each study started in action mode and 50% started in goal mode. This was done to test if the order of usage modes influences the results. For neither study was an influence of the order on the results found.

After goal and action mode, the progress of each study varied. Therefore, the end of each study will be discussed in the according section of each study.

4.2 Study 1: Nintendo Wii Motion Plus™

Study 1 was conducted to test the fit of Balanced TAM for hedonic products (Kauer et al., in print). The study and the according results will be presented in this section.

4.2.1 Object of Study

To examine whether Balanced TAM is able to explain *technology acceptance* of hedonic products more accurate than revised TAM (Heijden, 2004; Chesney, 2006), a hedonic product was chosen as the object of the first study. As explained in Section 2.1, no clear categorisation of products as hedonic or utilitarian is possible due to the fact that the perceived product character depends on the user and the usage intention. Therefore, a product was chosen which is mainly used because the usage leads to positive emotions instead of helping the

user to fulfil goals. Thereby, the product would be categorised as hedonic. The object of the study was the Wii Motion Plus™ with the software „Wii Sports Resort™ “. The Nintendo Wii Motion Plus™ is a gaming console that has a three dimensional tracking of movements, which enables the control of video games with the help of physical movements of the player (Nintendo of Europe GmbH 2010). Figure 10 shows the controller of the Wii Motion Plus™. The study proceeded in May 2010 at the Technische Universität Darmstadt. To ensure that participants did not include their opinion about familiar games, only participants who have no experience with the Wii Motion Plus™ and Wii Sports Resorts™ were allowed to attend the experiment.

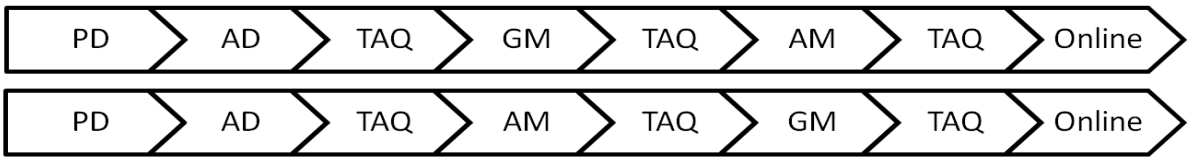
Figure 10: Controller of the Nintendo Wii™. Blue circle indicates add-on for Wii Motion Plus™ (http://www.nintendo.com/wii/console/accessories/wiimotionplus).

4.2.2 Participants

70 people (21 males and 49 females) participated in the study. Almost all participants were psychology students of the Technische Universität Darmstadt and received no reward for their participation. Two of the male participants were excluded from the evaluation because they were familiar with the Wii Motion Plus™. The remaining participants were aged between 19 and 45 years with an average of 24.75 years (SD = 5.09).

4.2.3 Procedure

The study consisted of 4 separate phases (see Figure 11). Each phase included questionnaires, which had to be answered by the participants. To enable a correct mapping between the different questionnaires from the four phases a code had to be generated by each participant to ensure anonymity.



PD = Personal Data
AD = official Advertisement for Motion Plus™
GM = Goal mode
AM = Goal mode
Online = Online survey with TAQ
TAQ = technology acceptance questionnaire

Figure 11: Procedure of study 1 for hedonic products (Wii Motion Plus™). Each row presents one possible order of the tasks. Both orders were counterbalanced and permutated.

In the first phase of the experiment, participants were asked to answer some personal questions. Besides the general questions this included, if they possess a Wii™ or a Wii Motion Plus™ and how often they use their Wii™ and which kind of games (e.g. sports games, role play games) they prefer in general. A last general question asked about the participants experiences with real sports to check whether someone who already practiced a sport in real life has either a different acceptance of the system or a different performance in the corresponding game. The whole questionnaire for Phase 1 can be found in Appendix A. Afterwards, the official Wii™ advertisement was presented to all participants to ensure a common basis for product appraisal. The mood of the participants was then checked with the help of a two-dimensional scale ranging from “low” to “high” for activation and from “bad” over “neutral” to “good” for mood, because mood is seen to imply arousal and valence (cf. Jennings et al., 2000). The self-designed technology acceptance questionnaire (TAQ) followed the mood assessment. To countercheck the results of the TAQ the AttrakDiff2™ (Hassenzahl, Burmester, & Koller, 2003) was used. At the end of Phase 1 the mood was assessed again.

For Phase 2 the mood was checked in the beginning, followed by the goal mode. For the case of the Wii Motion Plus™ the goal mode was implemented by a defined goal which had to be reached in a defined time by each participant. In the case of this study that meant reaching in the game archery 90 points during one try. Each try consisted of four different distances with three arrows for each distance. The participants got a written explanation of the game including the according controls and had five minutes to practice (see Appendix B).

Afterwards, time was restricted to ten minutes to reach the 90 points. In this phase the number of trials, the time required, and the achieved scores were recorded. The goal mode ended after ten minutes and each participant had to answer a slightly adapted version of the NASA-TLX Zeis (Pfendler & Thun 1989) to assess perceived performance, frustration, and how they liked the game. Afterwards, the TAQ and the AttrakDiff2™ were answered again. The Phase 2 ended with the assessment of the current mood.

The sequence of Phase 3 is equal to the sequence of Phase 2. Only the goal mode was replaced by the action mode. Action mode meant that participants had the chance to try out each game from the Wii Sports Resorts™ software. For methodical reasons, the order of Phase 2 and Phase 3 was permutated and counter-balanced; therefore guaranteeing that participants who started with the action mode have no advantages compared to participant starting with the goal mode. This led to the exclusion of archery from the action mode. Besides that, participants were allowed to play each game as long as they want. In action mode, the overall playing time was recorded as well as the chosen games and the time for each game. After Phase 3 the on-site experiment ended and the participants were discharged. For each participant, the laboratory part of the experiment took about 1.5 hours.

Phase 4 of the study was a follow-up online questionnaire two weeks later. Again, participants were asked to answer the TAQ and the AttrakDiff2™. The questionnaire ended with a mood assessment. Additionally, usage durations of the Wii™ during the two weeks period were assessed.

4.2.4 Experimental Setup

The study was conducted in a black room of the Technische Universität Darmstadt. The video was projected on a white wall sized 3.2m wide and 2.7m high. At 4.2m away from the wall the sensor was placed in a height of 0.6m. The gaming space started directly behind the sensor and was restricted to a 4m * 3m area.

4.2.5 Results

In accordance with the chapter “Research Model and Hypotheses” the results are structured as follows: first, results on internal consistency and validity of constructs are presented, followed by results on the general hypotheses. The result section is closed with results on product character and usage modes.

4.2.5.1 Internal Consistency and Construct Validity

The study on the Wii Motion Plus™ was the first time the TAQ was applied to measure technology acceptance and the according impact factors. Therefore, the internal consistency and the construct validity had to be checked.

To check the internal consistencies of the scales *perceived usefulness*, *perceived ease of use*, *perceived enjoyment*, *identification* and *stimulation* Cronbach's α (Cronbach, 1951) was computed, which is a measure for internal consistency of the items. A good internal consistency means that there is little item-specific variance (Cortina, 1993). Due to the fact that the number of items included in a scale influences the resulting Cronbach's α, the number of items per scale was reduced as far as possible (Cortina, 1993). The resulting Cronbach's α can be seen in Table 2. Because the Technology Acceptance Questionnaire was used at 4 points in time, Cronbach's α is computed 4 times per scale.

"According to Nunnally (1978, cited by Peterson, 1994) the Cronbach's α for preliminary research should be at least .7, for basic research .8" (Kauer, Theuerling and Bruder, in print). All scales of this thesis reach the required levels except for *stimulation.* The low Cronbach's α of *stimulation* might has multiple reasons: 1. the applied items are not appropriate to measure stimulation or 2. the two parts of *stimulation* (novelty and increase in competence) are rated differently, and therefore a high Cronbach's α for the whole scale cannot be expected. To check this, the means for the items for competence and the means for novelty were computed. T-tests for paired samples revealed that at each point in time the results for both parts differed very highly significant (T1 = 7.156, df = 67, p = .001***; T2 = 9.719, df = 67, p = .001***; T3 = 10.846, df = 67, p = .001***; T4 = 9.195, df = 67, p = .001***) This leads to the conclusion that the insufficient Cronbach's α is due to different levels of novelty and competence within the product and is therefore, not considered to be problematic. *Stimulation* is further used for the validation of the Balanced TAM.

Table 2: Overview of all cronbach's α for each point in time (1 = pre-usage mode, 2 = goal mode, and 3 = action mode, and 4 = online questionnaire).

Construct	Cronbach´s α	Construct	Cronbach´s α
Perceived usefulness 1	.803	Perceived enjoyment 1	.845
Perceived usefulness 2	.872	Perceived enjoyment 2	.812
Perceived usefulness 3	.863	Perceived enjoyment 3	.879
Perceived usefulness 4	.830	Perceived enjoyment 4	.888

Perceived ease of use 1	.809	Stimulation 1	.621
Perceived ease of use 2	.836	Stimulation 2	.498
Perceived ease of use 3	.782	Stimulation 3	.459
Perceived ease of use 4	.725	Stimulation 4	.601
Attitude 1	.918	Identification 1	.805
Attitude 2	.750	Identification 2	.786
Attitude 3	.829	Identification 3	.796
Attitude 4	.862	Identification 4	.830
Intention 1	.873	Acceptance 1	.913
Intention 2	.924	Acceptance 2	.928
Intention 3	.915	Acceptance 3	.932
Intention 4	.898	Acceptance 4	.918

The construct validity is the extent to which the measure is describing what was intended and to what degree it is able to accurately reflect the theoretical concept (Agresti & Finlay, 2009, p. 11). One way to check if a measurement possesses a high validity is to compare results of the measurement with objective data, to see whether those correlate. For this study, it was only possible to check the scale *perceived ease of use* for validity. This was done by comparing the rating of *perceived ease of use* during the goal mode between objectively "good" participants with objectively "bad" ones. "Good" were all participants who reached the 90 points in the game archery within a first trial, "bad" were all participants who needed three or more trials. It appeared that participants who achieved 90 points at their first attempt rated the *perceived ease of use* of the Nintendo Wii Motion Plus™ higher than participants who needed three trials ($t = 2.876$; $df = 23.159$; $p = .002$) after the goal mode. Before playing, the anticipated *perceived ease of use* did not differ between both groups ($t = -0.078$; $df = 46$; $p > .05$). This indicates, that participants who performed poorer and therefore perceived the system to be more cumbersome to use, rated it worse in *perceived ease of use* than those participants without problems in the handling of the system. This is an indicator for a good validity of the measurement for *perceived ease of use*.

The validity of the other constructs was not as easy to countercheck as for *perceived ease of use*. Because most of the constructs had been used throughout several evaluations with reasonable results (e.g. Atkinson & Kydd, 1997; Dishaw & Strong, 1999; Venkatesh & Davis, 2000; Moon & Kim, 2001; Hsu & Lu, 2004; Wixom & Todd, 2005; Arning & Ziefle, 2007;

Chan & Teo, 2007; Wu & Kuo, 2008; Bhattacherjee & Sanford, 2009; Shih, 2009; Tzou & Lu, 2009; Wu, 2009) the validity of the other constructs is assumed within this work.

4.2.5.2 General Results

The general results section includes two parts: an overview of the descriptive measures to enhance the understanding of the following results and the results of the study that refer to the general hypotheses. The descriptive measures are presented first.

4.2.5.2.1 Descriptive Measures

To enable a proper interpretation of all results, it is helpful to know the descriptive measures. Table 3 gives an overview of the means and standard deviation for each construct at each point in time.

Table 3: Descriptive values (mean and standard deviation) for each construct at each point in time (1 = pre-usage mode, 2 = goal mode, and 3 = action mode, and 4 = online questionnaire).

Construct	mean	SD	Construct	mean	SD
Perceived usefulness 1	2.98	1.14	Perceived enjoyment 1	5.17	0.98
Perceived usefulness 2	3.03	1.32	Perceived enjoyment 2	6.07	0.91
Perceived usefulness 3	3.06	1.25	Perceived enjoyment 3	6.17	0.89
Perceived usefulness 4	2.94	1.22	Perceived enjoyment 4	6.02	0.99
Perceived ease of use 1	4.92	0.89	Stimulation 1	3.96	0.90
Perceived ease of use 2	5.60	0.91	Stimulation 2	4.41	0.83
Perceived ease of use 3	5.48	0.85	Stimulation 3	4.41	0.83
Perceived ease of use 4	5.65	0.69	Stimulation 4	4.32	0.91
Acceptance 1	4.03	1.30	Identification 1	3.58	1.16
Acceptance 2	4.68	1.32	Identification 2	3.88	1.19
Acceptance 3	4.66	1.30	Identification 3	3.88	1.19
Acceptance 4	4.46	1.29	Identification 4	3.76	1.20

As can be seen in Table 3 the Wii Motion Plus™ is not perceived to be useful but quite easy to use. *Stimulation* and *identification* range at a medium level. In contrast, the *perceived enjoyment* is rated very high. Still, the *technology acceptance* of the product ranges only at a medium level. Referring back to the classification of the Wii Motion Plus™ as hedonic product, this can be verified by the descriptive data due to the low perceived support in goal fulfilment and high possibility to evoke positive emotions.

4.2.5.2.2 General Hypotheses

In this section, the results for the general hypotheses from section 3.2.1 will be partially checked, starting with Hypothesis 1 (Intention to use and attitude towards usage can be integrated to an overlying measure of technology acceptance). Hypothesis 2 (Balanced TAM has a higher explanatory power for technology acceptance than revised TAM for hedonic and dual use products) can only partially be examined due to the fact that it refers to hedonic and dual use products. Therefore, a concluding analyse follows in the joint results section. Hypothesis 3 (The explanatory power of Balanced TAM differs between different product characters and different usage modes with) and Hypothesis 4 (Product character and usage mode influence which factors determine technology acceptance with) will be analysed in a separate chapter, due to the fact that the results of all three studies are necessary to make well-founded statements whether they have to be rejected or not.

First, the Hypothesis 1 (Intention to use and attitude towards usage can be integrated to an overlying measure of technology acceptance) is checked with reference to the definition of Dethloff (2004), who states that technology acceptance combines the attitude towards a technology and the intention to use it. To test Hypothesis 1 the internal consistency of the resulting scale *technology acceptance* was checked by computing Cronbach´s α for each point in time ($H0_{1\text{-}1}$) and conducting a factor analysis ($H0_{1\text{-}2}$). The values for Cronbach's α range from .913 to .932. Therefore, $H0_{1\text{-}1}$ has to be rejected and $H1_{1\text{-}1}$ is seen to be verified. The factor analysis with the items of both constructs showed that all items loaded together on a single dimension. Therefore, $H0_{1\text{-}2}$ has to be rejected and $H1_{1\text{-}2}$ is seen to be verified. Based on these findings one technology acceptance factor was built out of the means of both scales, which is referred to as *technology acceptance*. Hypothesis 1 is verified and *technology acceptance* is used as resulting measure for all following model validations.

Hypothesis 2a states that Balanced TAM (Kauer, Theuerling, & Bruder, in print) has a higher explanatory power for *technology acceptance* than revised TAM (Heijden, 2004; Chesney, 2006) for hedonic products. To test whether Balanced TAM has a better explanatory power than revised TAM simple and multiple linear regressions were computed. Table 4 gives an overview over the prediction strength for revised TAM, Table 5 shows the prediction strength for Balanced TAM.

Table 4: Explanatory power (adjusted R^2) of revised TAM for hedonic products. All values are standardised β-coefficients.

	Constructs					
Mode	adjusted r^2 PEOU → PU	adjusted r^2 PEOU → PE	Perceived Usefulness	Perceived ease of use	Perceived Enjoyment	Explained variance of intention to use (adjusted)
Pre-usage	n.s.	.706***	.585***	.378***	n.s.	.685 (.572)***
Goal	n.s.	.557***	.347***	n.s.	.517***	.526 (.510)***
Action	.323*	.486***	.345***	n.s.	.574***	.613 (.601)***
Online	n.s.	.578***	.338***	.217*	.474***	.633 (.613)***

For revised TAM the regressions were computed to explain variance of *intention to use* because in original literature Davis et al. (1992) used it as indicator of technology acceptance.

Table 5: Explanatory power (adjusted R^2) of Balanced TAM for hedonic products. All values are standardised β-coefficients.

	Constructs								
Mode	adjusted r^2 PEOU → PU	adjusted r^2 PEOU → PE	adjusted r^2 PEOU → Ident	Perceived Usefulness	Perceived ease of use	Perceived Enjoyment	Identification	Stimulation	Explained variance of technology acceptance (adjusted)
Pre-usage	n.s.	.706***	.482***	n.s.	n.s.	.226*	.599***	.236**	.780 (.769)***
Goal	n.s.	.557***	.247*	n.s.	.165*	.217*	.664***	n.s.	.772 (.761)***
Action	.323*	.486***	.382***	n.s.	.143*	.353***	.557***	n.s.	.803 (.794)***
Online	n.s.	.578***	.390***	n.s.	n.s.	.393***	.480***	.182*	.804 (.793)***

According to the new definition *technology acceptance* as combined measure of *intention to use* and *attitude* was used as measure for acceptance. The adjusted explained variance for revised TAM varies between 51.0% and 61.3%. The adjusted explained variance for Balanced TAM varies between 76.1% and 79.4%. In his book, Schöberl (2004) offers a formula (see Formula 1) to compare different percentages for significance. Additionally, he offers a website (www.tests-im-direktmarketing.de) on which these comparisons can be computed. This website was used within this thesis. The significance is computed as follows:

$$Z = \sqrt{\frac{n_1 * n_2 * (P_1 - P_2)^2}{n_2 * P_1 - n_2 * P_1^2 + n_1 * P_2 - n_1 * P_2^2}}$$

Z = check digit
P_1 = percentage of group 1
P_2 =percentage of group 2
n_1 = number of participants group 1
n_2 =number of participants group 2

Formula 1: Formula to compare different percentages for significance according to Schöberl (2004).

Table 6 gives an overview of the statistical comparisons of the explained variance according to Schöberl (2004).

This leads to the conclusion that Balanced TAM has a higher adjusted R^2 for hedonic products than revised TAM does. Therefore, $H0_{2a}$ has to be rejected and $H1_{2a}$ is accepted. Hypothesis 2a is verified. Balanced TAM has a higher explanatory power for hedonic products than revised TAM.

Table 6: Comparison of explained variance between revised and Balanced TAM.

	Study Wii Motion Plus™		
Mode	Revised TAM	Balanced TAM	Level of significance
Pre-usage	.572	.769	.05*
Goal	.510	.761	.01**
Action	.601	.794	.05*
Online	.613	.793	.05*

4.2.5.3 Hypotheses on Product Character

Within this section all hypotheses regarding the product character for hedonic products will be investigated, starting with Hypothesis 5c (After reaching medium level, pragmatic qualities having no influence on technology acceptance for hedonic products (hygiene fac-

tor)). To test this hypothesis, first the descriptive measures for *perceived usefulness* and *perceived ease of use* are investigated. All descriptives can be seen in Table 3. As it can be seen that the values for *perceived ease of use* are at a medium to positive level, whereas the *perceived usefulness* of the Wii Motion Plus™ is perceived to be rather low. The low *perceived usefulness* rating (< 3.5 for each point in time) did not influence the *technology acceptance* at any time. Therefore, $H0_{5c\text{-}1b}$ is accepted and *perceived usefulness* cannot be seen as a hygiene factor for mainly hedonic products. Otherwise, it would have had a negative impact on the *technology acceptance* rating. On the other hand, *perceived ease of use* was rated higher than 3.5 at each point in time. According to $H1_{5c\text{-}2a}$ *perceived ease of use* should not influence *technology acceptance* directly, if it is a hygiene factor. But as can be seen in Table 5 *perceived ease of use* has a relevant impact on *technology acceptance* during action and goal mode. Therefore, $H0_{5c\text{-}2a}$ is accepted, which means that *perceived ease of use* is not a hygiene factor for hedonic products. This leads to the rejection of Hypothesis 5c. Pragmatic qualities are not hygiene factors in the context of hedonic products.

Next, Hypothesis 6 (The explanatory power of hedonic qualities (p*erceived enjoyment*, *identification*, and *stimulation*) depends on the product character) is tested. Hypotheses 6 is investigated in three single Hypotheses: Hypothesis 6a states that *identification* is the most important predictor of *technology acceptance* for hedonic products, Hypothesis 6b assumes *perceived enjoyment* to be the second most important predictor of *technology acceptance* for hedonic products, and Hypothesis 6c finally, predicts *stimulation* to be a better predictor of *technology acceptance* than pragmatic qualities for hedonic products. All hypotheses are tested using the results from Table 5.

As predicted in $H1_{6a}$ *identification* has the highest standardised β-weights of all predictors and can therefore be assumed to be the most important predictor of *technology acceptance* for hedonic products. Therefore, $H1_{6a}$ is accepted. Hypothesis 6a is verified. *Identification* can be seen as the most influential factor on *technology acceptance* for hedonic products.

The standardised β-weights of *perceived enjoyment* have the second highest values for the prediction of *technology acceptance* in 3 of 4 points in time. This is conforming to $H1_{6b}$ which is therefore accepted. Hypothesis 6b is verified. *Perceived enjoyment* can be seen as the second most influential factor on *technology acceptance* for hedonic products.

S*timulation* had a significant impact on *technology acceptance* in the pre-usage mode and in the online-condition but not in action or goal mode. Comparing the standardised β-

weights of *stimulation* in the pre-usage and online condition with the standardised β-weights of *perceived ease of use* in action and goal mode *stimulation* has the higher β-weights. This is conforming to $H1_{6c}$ which is therefore accepted. Hypothesis 6c is verified. *Stimulation* is a better predictor of *technology acceptance* than pragmatic qualities for hedonic products.

After having investigated all hypotheses that referred to the product character, the next section will investigate the impact of the different usage modes.

4.2.5.4 Hypotheses on Usage Mode

According to Hypothesis 7 it is expected that the explanatory power of the hedonic and pragmatic qualities depends on the usage mode with hedonic qualities being more important in action mode (Hypothesis 7a) and pragmatic qualities being more important in goal mode (Hypothesis 7b).

To test Hypothesis 7a the standardised β-weights of the hedonic qualities were added up for action and goal mode separately and both values were compared. The added standardised β-weights of the hedonic qualities for action mode are .910, whereas the added up standardised β-weights of the hedonic qualities for goal mode are .881. This is in accordance with $H1_{7a}$ which is therefore accepted. Hypothesis 7a is verified. Hedonic qualities are more important in action mode than in goal mode for hedonic products.

The same procedure was applied to test Hypotheses 7b. The standardised β-weights of the pragmatic qualities were compared between the usage modes. Because *perceived usefulness* was not significant at any point in time the added standardised β-weights of *perceived ease of use* are the added up standardised β-weights. In goal mode the standardised β-weight was .165 and .143 in goal mode. This is conforming to $H1_{7b}$ which is therefore accepted. Hypothesis 7b is verified. Pragmatic qualities are more important in goal mode than in action mode.

4.2.5.5 Summary of the Results for Study 1

Study 1 used the Nintendo Wii Motion Plus™ to investigate the predictive power of Balanced TAM for hedonic products. All scales besides *stimulation* had sufficient internal consistency. Still, s*timulation* was considered for the model because this insufficiency was due to the definition of *stimulation* which consists of two parts.

The results of Study 1 verify that an integration of *attitude* and *intention to use* to one overlying *technology acceptance* measure is appropriate. This measure is used for further

studies as well. The assumption of pragmatic qualities as hygiene factor had to be rejected for *perceived usefulness* and *perceived ease of use*, because *perceived usefulness* did not negatively influence *technology acceptance* even though it was rated very low, and *perceived ease of use* did still influence *technology acceptance* even though it was rated quite high. As expected, the explanatory power of hedonic qualities was higher than the explanatory power of pragmatic qualities in both usage modes. But a slight difference between both modes indicates that the relative relevance of pragmatic qualities is higher in goal mode, whereas the relative relevance of hedonic qualities is higher in action mode. Overall, *identification* was the most important impact factor on *technology acceptance*, followed by *perceived enjoyment, stimulation* and *perceived ease of use*. *Perceived usefulness* had no impact at any point in time. Still, the explanatory power of the Balanced TAM was remarkable higher than that of revised TAM which included only the pragmatic qualities and *perceived enjoyment*.

4.3 Study 2: Apple iPad™

Study 2 was conducted in the style of Study 1 for a dual use product. Scope of this study was to investigate whether the integration of hedonic factors adds explanatory value to revised TAM for dual use products, too. The recruitment of participants and the conduction of the experiment were carried out with the help of a number of student workers (Heil 2011, Götze 2011, Blachetzki 2011, Czajkowski 2011, and Blöcker in preparation) under supervision of the author of this thesis.

4.3.1 Object of Study

The scope of study two was to investigate the explanatory power of Balanced TAM for dual use products. To avoid answer biases, a dual use product had to be chosen which was fairly new at the beginning of the study. The study proceeded between November 2010 and August 2011 at the Technische Universität Darmstadt. The Apple iPad™ (32GB and 3G) was chosen as object of study, because it integrates communication and organising functions with hedonic aspects like video games (Jaroslovsky, 2010). The Apple iPad™ could be pre-ordered from May, 10th on in Germany. Only participants who had not already used an iPad were allowed to attend the experiment.

Figure 12: The Apple iPad 1 (http://www.apple.com/de).

4.3.2 Participants

38 people (21 males and 17 females) participated in the study. The participants received no reward for their participation, but were allowed to use the iPad™ 2 weeks for private purpose at home. The participants were aged between 18 and 60 years with an average of 28.39 years (SD = 9.42). None of the participants was familiar with the Apple iPad™, but half of the participants were familiar with the Mac iOS due to the fact that they possess either an iPhone™ or an iPod™.

4.3.3 Procedure

The study consisted of three separate phases (see Figure 13). Each phase included questionnaires, which had to be answered by the participants. To enable a correct mapping between the different questionnaires from the three phases, a code had to be generated by each participant to ensure anonymity.

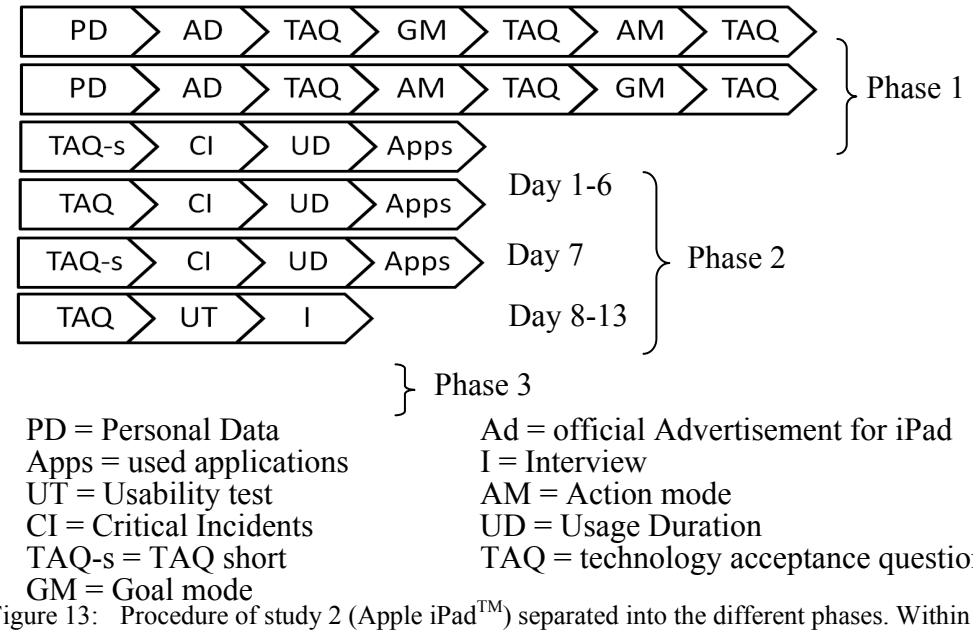


Figure 13: Procedure of study 2 (Apple iPad™) separated into the different phases. Within Phase 1 two different orders of goal mode were used. The orders were counterbalanced and permutated.

The laboratory experiment was organised as described in the general methodology (pre-usage mode, goal mode, and action mode) and ended with an interview. During the goal mode each participant had to solve 5 tasks. Those tasks were chosen to test the usability of the iPad™ itself and therefore did not include any application that had to be bought or downloaded on the iPad™. One of the tasks was for example the changing of the favorite search engine used by the iPad™. All tasks can be seen in Appendix C. During the action mode, 2 Participants reached the time limit of 30 minutes and their action mode was therefore interrupted by the experimenter. As in all studies, the order of action and goal mode was permutated and counter-balanced. After each mode, the TAQ and the AttrakDiff2™ were answered. An interview ended Phase 1. Scope of the interview was the assessment of motivators for the usage of the iPad™. The interview was semi-structured and the method of laddering (Veludo-de-Oliveira et al., 2006) was used. All questions can be found in the Appendix D. Overall, Phase 1 took between 2 and 2.5 hours per participant. Participants then were given the iPads™ and a diary before they were dismissed.

Phase 2 consisted of an on-site usage phase of two weeks. Participants were allowed to use the iPad™ as if it were theirs. The only restriction was they were not allowed to lend the iPad™ somebody else. Additionally, the participants were asked to answer a short questionnaire in form of a daily diary. The diary included a shortened version of the technology acceptance questionnaire (TAQ-s), a question for critical incidents (cf. Flanagan, 1954), the daily

usage duration and which applications were used. The diary remained the same each day apart from day 7 when participants had to answer the long version of the TAQ. Compare Appendix E for the complete diary.

The study concluded with a second laboratory experiment on day 14. Again, participants had to answer the long version of the technology acceptance questionnaire and the AttrakDiff 2™, followed by a second usability test. The usability test included 5 tasks, which had a similar difficulty level than the 5 tasks from the first usability test (see Appendix F). Participants were dismissed after a second interview (see Appendix G). Overall, Phase 3 took between 1 and 1.5 hours.

4.3.4 Experimental Setup

The study was conducted in a laboratory room at the Institute of Ergonomics at Technische Universität Darmstadt. Participants were seated on a table. The zone in which the participants were allowed to use the iPad™ was restricted with help of a crape tape. This restriction was to enable a video recording of action and goal mode.

4.3.5 Methods

To be able to compare the results of all studies as easy as possible, the technology acceptance questionnaire was not modified between Study 1 with the Wii™ and Study 2 with the iPad™. The only adjustment was the replacement of the word “Wii” with the word “iPad”. The TAQ-s consisted of the items for each scale which proved to be the best representative of each scale, which was determined by the results for Cronbach’s α from Study 1.

Because the model validation was integrated in a more comprehensive study on the usability and usage behaviour of the iPad™, an additional eye gaze movement study and interviews were conducted, which will not be analysed within this thesis.

4.3.6 Results

Again, results are grouped according to Chapter 3.2 which divides the hypotheses into general hypotheses, hypotheses on product character, hypotheses on usage mode, and hypotheses on product character and usage mode. First, the descriptive measures are presented.

4.3.6.1 General Results

As for Study 1, the general results consist of the descriptive measures for each scale as well as of the results for the general hypotheses. First, the descriptive measures will be examined.

4.3.6.1.1 Descriptive Measures

For a dual use product it is expected that pragmatic and hedonic qualities are both existent. The descriptive measures can be seen in Table 7. The iPad™ is perceived to be easy to use and enjoyable, which is conforming to the assumption of a dual use product. Overall, no scale ranges in a very low or very high area and even the technology acceptance is on a medium level and decreases over time.

Table 7: Descriptive values (mean and standard deviation) for each construct at each point in time (1 = pre-usage mode, 2 = goal mode, and 3 = action mode, 4 = home usage phase, 5 = laboratory test after home usage).

Construct	mean	SD	Construct	mean	SD
Perceived usefulness 1	4.17	1.29	Perceived enjoyment 1	5.54	1.06
Perceived usefulness 2	4.34	1.24	Perceived enjoyment 2	5.49	0.94
Perceived usefulness 3	4.42	1.29	Perceived enjoyment 3	5.62	0.90
Perceived usefulness 4	3.95	1.55	Perceived enjoyment 4	4.99	1.23
Perceived usefulness 5	3.82	1.56	Perceived enjoyment 5	4.66	1.36
Perceived ease of use 1	5.21	1.16	Stimulation 1	3.96	0.90
Perceived ease of use 2	5.36	1.28	Stimulation 2	4.17	0.96
Perceived ease of use 3	5.28	1.19	Stimulation 3	4.16	0.91
Perceived ease of use 4	5.41	1.07	Stimulation 4	3.63	1.00
Perceived ease of use 5	5.42	1.02	Stimulation 5	3.55	1.11
Acceptance 1	4.91	1.04	Identification 1	3.56	1.07
Acceptance 2	5.22	1.00	Identification 2	3.68	1.03
Acceptance 3	5.24	0.97	Identification 3	3.61	1.07
Acceptance 4	4.60	1.33	Identification 4	3.37	1.20
Acceptance 5	4.41	1.15	Identification 5	3.16	1.24

4.3.6.1.2 General Hypotheses

Study 2 checks again, if *technology acceptance* can be seen as a combined measure (Hypothesis 1: *Intention to use* and *attitude* towards usage can be integrated to an overlying measure of *technology acceptance*). To check $H1_{1\text{-}2}$ a factor analyses was computed for each point in time that showed that all items of *intention to use* and *attitude* towards usage always

loaded on one single dimension. Together with the high Cronbach's α of the combined factor (.809 to .901), which confirmed $H1_{1\text{-}1}$, Hypotheses 1 is verified. Therefore, *technology acceptance* can be measured as a combination of *intention to use* and *attitude* towards usage.

For Hypothesis 2b (Balanced TAM has a higher explanatory power for technology acceptance than revised TAM for dual use products) multiple linear regressions were computed. Table 8 shows the explanatory power of revised TAM (Heijden, 2004; Chesney, 2006), whereas the explanatory power of Balanced TAM can be seen in Table 9. All values are standardised β-coefficients.

Table 8: Explanatory power (adjusted R^2) of revised TAM for dual use products. All values are standardised β-coefficients.

	Constructs					
Mode	adjusted r^2 PEOU → PU	adjusted r^2 PEOU → PE	Perceived Usefulness	Perceived ease of use	Perceived enjoyment	Explained variance of intention to use (adjusted)
Pre-usage	.341*	.521**	.662***	n.s.	n.s.	.438 (.422)***
Goal	.387*	.433*	.572***	n.s.	.274*	.495 (.466)***
Action	.335*	.436*	.589**	n.s.	.269*	.453 (.486)***
Diary	n.s.	n.s.	.526***	n.s.	.450***	.682 (.663)***
Labratory test	n.s.	n.s.	.600***	n.s.	.346**	.653 (.633)***

It can be seen, that the explanatory power of revised TAM lies between 42.2% in the pre-usage mode and 63.3% in the "diary" condition. Balanced TAM is able to explain between 58.3% (action mode) and 82.7% (laboratory test) variance of *technology acceptance*. There exists no condition under which revised TAM was better than Balanced TAM. Still, a statistical comparison of the explained variance in percentage according to Schöberl (2004) reveals that the differences in action mode and in the diary condition are not significant (see Table 10). This might be due to the low number of participants within the study. Nevertheless, Balanced TAM is better under 3 of 5 conditions. Therefore, the Hypothesis 2b is verified. Balanced TAM explains more variance than revised TAM for dual use products.

Table 9: Explanatory power (adjusted R^2) of Balanced TAM for dual use products. All values are standardised β-coefficients.

	Constructs								
Mode	adjusted r^2 PEOU → PU	adjusted r^2 PEOU → PE	adjusted r^2 PEOU → Ident	Perceived Usefulness	Perceived ease of use	Perceived enjoyment	Identifica-tion	Stimulation	Explained technology accep-tance (adjusted)
Pre-usage	.341*	.521**	n.s.	.355**	.369***	n.s.	n.s.	.344**	.686 (.658)***
Goal	.387*	.433**	n.s.	.291*	.220*	.306**	.328*	n.s.	.739 (.707)***
Action	.335*	.436**	.426**	n.s.	.320*	n.s.	.311*	.332*	.617 (.583)***
Diary	n.s.	n.s.	n.s.	.248*	.207*	.240*	.445**	n.s.	.756 (.725)***
Laboratory test	n.s.	n.s.	n.s.	.445***	.226**	.281**	.274*	n.s.	.846 (.827)***

Table 10 : Differences between explained variance of revised and Balanced TAM separated according to the usage modes.

	Study Apple iPad™		
Mode	Revised TAM	Balanced TAM	Level of significance
Pre-usage	.422	.658	.05*
Goal	.466	.707	.05*
Action	.486	.583	n.s.
Diary	.663	.725	n.s.
Laboratory	.633	.827	.10(*)

As stated in Hypothesis 4b (Usage mode being more important for the determination of influencing factors on technology acceptance for dual use products than the product character) it is expected that the usage mode is more relevant for the explanation of *technology acceptance* than the product character. To test this hypothesis, the significant impact factors are investigated. According to $H1_{4b}$ it is expected that the impact factors between the usage modes do vary. As can be seen in Table 9 in goal mode *perceived usefulness, perceived ease of use, perceived enjoyment,* and *identification* do significantly explain variance of *technology acceptance,* whereas in action mode *perceived ease of use, identification,* and *stimulation* explain variance. Therefore, Hypotheses 4b is verified. The usage mode is more important for the determination of impact factors on *technology acceptance* of dual use products than the product character. It can be assumed that for dual use products the *technology acceptance* depends on the different impact factors that vary between the usage modes.

Due to the fact that dual use product do not have an easy to categorise product character which can be examined without considering the usage mode, no hypotheses exist relating only to product character or usage mode for dual use products. Therefore, those hypotheses will be skipped and the next section (Chapter 4.3.6.1.3) will investigate the hypotheses which relate to the interaction between product character and usage modes.

4.3.6.1.3 Results on Product Character and Usage Mode

Hypothesis 8 assumes that for dual use products it depends on the usage mode whether hedonic or pragmatic qualities have higher explanatory power. According to Hypothesis 8a hedonic qualities should be the most important predictors in action mode, whereas pragmatic qualities should be most important predictors in goal mode (Hypothesis 8b).

Table 9 shows that the overall explained variance in goal mode lies above the explained variance in action mode (70.7% vs. 58.3%). In goal mode, the explanatory power is reached with help of 4 variables: *perceived usefulness, perceived ease of use, perceived enjoyment* and *identification*. According to $H1_{8b}$ it is expected that the added standardised β-weights of pragmatic qualities (.511) are higher than those of hedonic qualities (.634) in goal mode. This is not the case. Therefore, $H1_{8b}$ has to be rejected and $H0_{8b}$ is accepted. Hypothesis 8b is rejected. Pragmatic qualities are not more important than hedonic qualities for the explanation of *technology acceptance* of dual use products in goal mode. Remarkably, the highest explanatory power belongs to the variables *perceived enjoyment* and *identification*, which are seen as hedonic qualities within this work. Table 7 gives an overview over the descriptive statistics for each construct and each point in time. It can be seen that the iPad is not rated high on *perceived usefulness*. The low value for *perceived usefulness* might be one reason for the weak explanatory power of the pragmatic qualities in goal mode. Another reason might be the product placement of Apple which concentrates on promoting the simplicity and coolness of the product instead of focusing on the utility of it. Still, Hypothesis 8b has to be rejected.

In contrast, the variance of action mode is explained by 3 variables: *perceived ease of use, identification* and *stimulation*. Even though the explained variance in action mode is lower than in goal mode the relative impact of hedonic qualities (.643) is stronger than that of pragmatic qualities (.320). This leads to the rejection of $H0_{8a}$ and the acceptance of $H1_{8a}$. Therefore, Hypothesis 8a is verified. Hedonic qualities are more important than pragmatic qualities for the explanation of *technology acceptance* of dual use products in action mode.

4.3.6.2 Summary of the Results of Study 2

Study 2 investigated the explanatory power of Balanced TAM for dual use products. Like Study 1, Study 2 verifies the assumption that *technology acceptance* can be measured as the combination of *intention to use* and *attitude* towards usage. Furthermore, it can be said

that for dual use products *technology acceptance* is more depending on the usage mode than it is for products with a quite clear product character (hedonic vs. utilitarian products). Even though pragmatic qualities were not the strongest predictors in goal mode as expected, the overall explained variance of Balanced TAM lies far above that of revised TAM.

As mentioned in Chapter 2.1 the perceived product character is heavily depending on the individual who judges the product and on the task the individual wants to perform. Therefore, a shift in the perceived product character over time is likely, but was not observed within this study (means of the descriptive values are equal for action and goal mode).

In combination, Study 1 and Study 2 give a good overview of the suitability of Balanced TAM for hedonic and dual use products. Still, some of the theoretical assumptions cannot be tested without having investigated a utilitarian product. Therefore, Study 3 uses the Ricoh Aficio™ – multifunctional device that prints, scans and copies – as example for utilitarian products to further investigate the Balanced TAM and its assumptions. Study 3 is presented in detail in the next section.

4.4 Study3: Ricoh Aficio™

One aim of this thesis is to test whether Balanced TAM surpasses the explanatory power of revised TAM in the context of hedonic and dual use products. This was proved in Study 1 (Wii Motion Plus™) and Study 2 (Apple iPad™). Moreover, it is of interest if Balanced TAM also succeeds in explaining technology acceptance of utilitarian systems. Additionally, a study with a mainly utilitarian product is needed to test all hypotheses that are concerned with the utilitarian product character. First, the object of study – the Ricoh Aficio™ – is introduced.

4.4.1 Object of Study

The object of the third study was the Ricoh Aficio 3350™, a multifunctional device that prints, scans, and copies (see Figure 14). This is a device mainly used in companies. On the homepage of the manufacturer it is described as follows: "[The Ricoh Aficio 3350 is] packed with advanced features for cost-effective copying, local printing via USB, fax communications and network scanning. […] With a short warm-up and fast speeds, these devices increase office productivity. Standard duplex, colour scanning, a high paper capacity, and wide media handling capabilities extend their versatility. These A3 MFPs offer you the functionality you need at a price you can afford." Clearly, the product description focuses on the

pragmatic qualities of the product. Thereby, it can be assumed that the Ricoh Aficio 3350^{TM} is a mainly utilitarian product.

Figure 14: Ricoh Aficio 3350^{TM} (www.ricoh-europe.com).

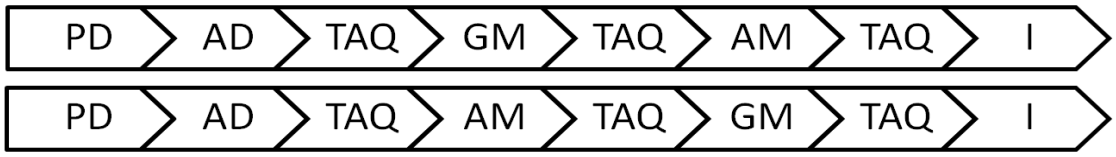
4.4.2 Participants

30 people (21 males and 9 females) participated in the study. The participants received no reward for their participation and were aged between 23 and 49 years with an average of 25.90 years (SD = 4.51). None of the participants was familiar with the Ricoh Aficio 3350^{TM} that was used within this study, but about half of the participants (13) were familiar with similar multifunctional devices and used them regularly. The other participants had used similar systems irregularly and the latest 6 month ago.

4.4.3 Procedure

The study consisted of the three parts described in the general section (pre-usage mode, goal mode and action mode). Again, the order of action and goal mode was counterbalanced and permutated. After the third part a semi-structured interview with laddering technique followed. The question of the interview can be found in Appendix H. Afterwards, the

participants were discharged from the experiment. For an overview of the procedure see Figure 15. Overall, the experiment lasted for about 1.5 hours per participant.



PD = Personal Data
AD = official Advertisement for Aficio 3350
I = Interview
GM = Goal mode
AM = Goal mode
TAQ = technology acceptance questionnaire

Figure 15: Procedure of study 3 for utilitarian products (Ricoh Aficio 3350™). Each row presents one possible order of the tasks. Both orders were counterbalanced and permutated.

4.4.4 Experimental Setup

The experiment was conducted at the Institute of Ergonomics (IAD) at the Technische Universität Darmstadt in November and December 2011. For the practical usage of the multifunctional device the facility room of the IAD was used in which all printers of the institute are installed. For the answering of the questionnaires and the interview a meeting room of the institute was used, except for the answering of the questionnaires between action and goal mode, which were answered in the facility room as well. This was due to the fact that an eye gaze analysis was conducted during the practical parts of the experiment and the system would have to be newly calibrated in case of an interruption of the analyses. That would lengthen the experiment remarkably. The changes of the rooms were necessary to prevent health problems because of the vapours of the printers and the volume in the room.

4.4.5 Methods

The TAQ and the AttrakDiff2™ were used to measure *technology acceptance*. They were both adapted to fit the Ricoh Aficio 3350™.

As in Study 2, the model validation was part of a comprehensive study on the usability of the multifunctional device. Therefore, an eye gaze movement study and an interview were conducted. Because only the model validation lies in the focus of this thesis, the according data was not analysed.

4.4.6 Results

This section presents the results of the laboratory study on the multifunctional device. Again, the chapter starts with the general results section and the descriptive measures and proceeds with the results on product character and usage mode.

4.4.6.1 General Results

Again, descriptive measures and the results for the general hypotheses will be presented in this section. Chapter 4.4.6.1.1 starts with the descriptive measures.

4.4.6.1.1 Descriptive Measures

It is expected that a product which is mainly utilitarian should be rated higher on pragmatic qualities than on hedonic qualities. As can be seen in Table 11 this is true for the multifunctional device which can be therefore categorised as a utilitarian product.

Table 11: Descriptive values (mean and standard deviation) for each construct at each point in time (1 = pre-usage mode, 2 = goal mode, and 3 = action mode).

Construct	mean	SD	Construct	mean	SD
Perceived usefulness 1	5.53	0.79	Perceived enjoyment 1	3.10	1.35
Perceived usefulness 2	5.57	0.77	Perceived enjoyment 2	3.27	1.28
Perceived usefulness 3	5.48	1.00	Perceived enjoyment 3	3.18	1.40
Perceived ease of use 1	4.48	0.86	Stimulation 1	3.33	1.06
Perceived ease of use 2	4.85	1.21	Stimulation 2	3.46	0.95
Perceived ease of use 3	4.59	1.28	Stimulation 3	3.19	1.03
Acceptance 1	5.39	0.76	Identification 1	1.98	1.05
Acceptance 2	5.48	0.95	Identification 2	1.97	0.84
Acceptance 3	5.34	1.10	Identification 3	2.02	1.03

4.4.6.1.2 General Hypotheses

Hypothesis 1 states that *technology acceptance* can be seen as a combination of *attitude* towards usage and *intention to use*. This was tested again in Study 3 with the Ricoh Aficio 3350^{TM}. $H1_{1b}$ was tested with a factor analysis for each point in time that showed that all items of *intention to use* and *attitude* towards usage always loaded on one single dimension. $H1_{1b}$ is therefore accepted. Together with the high internal consistency of the combined factor (Cronbach's α between .717 and .829) which is tested for $H1_{1a}$ this leads to the conclusion that Hypothesis 1 is again verified.

Within this thesis it is assumed that Balanced TAM has a higher explanatory power for technology acceptance than revised TAM (Heijden, 2004; Chesney, 2006) for hedonic and dual use products (Hypothesis 2). It is not assumed that the integration of hedonic qualities also adds explanatory value for utilitarian products. To test if there are differences between

both models for utilitarian products multiple linear regressions (stepwise) were computed. Table 12 shows the explanatory power of revised TAM, whereas the explanatory power of Balanced TAM can be seen in Table 13. All values are standardised β-coefficients.

Table 12: Explanatory power (adjusted R^2) of revised TAM for utilitarian products. All values are standardised β-coefficients.

	Constructs					
Mode	adjusted r^2 PEOU → PU	adjusted r^2 PEOU → PE	Perceived Usefulness	Perceived ease of use	Perceived enjoyment	Explained variance of intention to use (adjusted)
Pre-usage	.435*	.428*	.641***	n.s.	.288	.567 (.535)***
Goal	n.s.	n.s.	.457***	n.s.	.328*	.447 (.406)***
Action	.667***	n.s.	.654**	n.s.	.269*	.427 (.407)***

It can be seen, that the explanatory power of revised TAM lies between 40.6% in goal mode up to 53.5% in pre-usage mode. In contrast, Balanced TAM explains between 37.7% in action mode and 49.7% in goal mode. Therefore, the integration of hedonic qualities does not add explanatory power to revised TAM in the context of utilitarian systems.

In contrast to the expectation of Balanced TAM having the worst explanatory power of all conditions for utilitarian systems in goal mode, (Hypotheses 3b) Balanced TAM performed worst for utilitarian products in action mode (37.7% explained variance). Therefore, Hypothesis 3b has to be rejected.

Hypothesis 4a stated that the product character is more relevant to determining which factors influence *technology acceptance* than the usage mode for extreme product characters. This is tested by investigating which impact factors do influence *technology acceptance* in both usage modes ($H1_{4a}$). As can be seen in Table 13, *perceived usefulness* explains variance in both usage modes, whereas in goal mode – against the expectations – enjoyment adds explanatory value to the Balanced TAM. Therefore, $H0_{4a}$ is accepted and $H1_{4a}$ has to be rejected which leads to the rejection of Hypothesis 4a. The product character is not more important than the usage mode for extreme product characters. In the next section the hypotheses regarding the product character will be investigated.

Table 13: Explanatory power (adjusted R^2) of Balanced TAM for utilitarian products. All values are standardised β-coefficients. $^{(*)}$ marks a trend.

	Constructs								
Mode	adjusted r^2 PEOU → PU	adjusted r^2 PEOU → PE	adjusted r^2 PEOU → Ident	Perceived Usefulness	Perceived ease of use	Perceived enjoyment	Identification	Stimulation	Explained technology acceptance (adjusted)
Pre-usage	.449*	.428*	n.s.	.314**	.300$^{(*)}$	n.s.	n.s.	.395**	.539 (.486)***
Goal	.489**	n.s.	n.s.	.377*	n.s.	.482**	n.s.	n.s.	.531 (.497)***
Action	.661***	n.s.	n.s.	.632***	n.s.	n.s.	n.s.	n.s.	.399 (.377)***

4.4.6.1.3 Hypothesis on Product Character

Hypothesis 5 assumes that the explanatory power of the pragmatic qualities depends on the product character. For utilitarian products *perceived usefulness* is assumed to be the best predictor (Hypothesis 5a) and *perceived ease of use* the second best predictor (Hypothesis 5b). Looking at Table 12 (revised TAM) and Table 13 (Balanced TAM), the influence of both predictors varies between both models (revised TAM and Balanced TAM) and the usage modes. According to H15a it is expected that *perceived usefulness* has the highest standardised β-weights of all predictors independent of the usage mode. This is true for action mode but not for pre-usage and goal mode. Therefore, $H1_{5a}$ has to be rejected and $H0_{5a}$ is accepted. This leads to the rejection of Hypothesis 5a. *Perceived usefulness* is not the best predictor for *technology acceptance* of utilitarian products. Nevertheless, *perceived usefulness* is the only factor that is relevant for utilitarian products in all usage modes and additionally, it is the only explaining factor in action mode. The abbreviations from hypothesis 5a might be due to a bad choice for the utilitarian product. This will be discussed in detail in Chapter 5.2.

Furthermore, Hypothesis 5b was investigated by looking at the standardised β-weights of *perceived ease of use. Perceived ease of use* has only a significant impact on *technology acceptance* in the pre-usage mode and had no influence in the Balanced TAM during the real interaction with the multifunctional device (action and goal mode). For revised TAM *perceived ease of use* has no significant impact on predicting *technology acceptance* at all. This leads to the rejection of Hypothesis 5b. The relative relevance of pragmatic qualities is investigated within the next section.

4.4.6.1.4 Hypothesis on Usage Mode

Within the Hypothesis 7b it is assumed that pragmatic qualities are more important in goal mode than in action mode. This is tested by comparing the standardised β-weights of *perceived usefulness* and *perceived ease of use* between the usage modes. Looking at Table 13 it becomes obvious that the added standardised β-weights goal mode (.377), are smaller than those in action mode (.632). This leads to the rejection of $H1_{7b}$ and the acceptance of $H0_{7b}$. Therefore, Hypothesis 7b has to be rejected. Pragmatic qualities are not more important in goal mode than in action mode for utilitarian products. This – again – might be due to a bad product choice for the utilitarian product and is discussed in Chapter 5.2. To simplify the understanding of the results, the main results are summarised in the next section.

4.4.6.2 Summary of the Results of Study 3

Study 3 was able to show that the new definition of technology acceptance applies for utilitarian systems, too. In contrast, the predictive power for Balanced TAM does not differ from that of revised TAM. Against the expectations, Balanced TAM explains littlest variance for utilitarian systems in action mode. Furthermore, the pragmatic qualities were not always the most important predictors for technology acceptance of utilitarian systems. Until now, all studies were investigated individually but for the investigations of some hypotheses it is necessary to combine multiple results. This will be done in the next section (Chapter 4.5).

4.5 Comprehensive Results

Some of the hypotheses refer to the results of more than one study. This is true for Hypotheses 3 and 4 (general hypotheses), Hypotheses 5 and 6 (Hypotheses on product character) and for Hypothesis 7 (hypotheses on usage mode). The results for these hypotheses will be presented in this section. First, the results on the general hypotheses will be investigated.

4.5.1 General Results

In Hypothesis 3 it is expected that the explained variance of Balanced TAM differs between different product characters and usage modes. As can be seen in Table 15 this is true. The mean explained variance differs highly significantly between hedonic products and utilitarian products ($p < .01$) as well as between dual use products and utilitarian products ($p < .01$). No difference was found between hedonic and dual use products ($p > .05$).

To test whether the usage modes alone make a difference in predicting technology acceptance independent of the product character, the explained variance was summed up for each mode over the three studies. No significant difference was found between the modes if the product character is not considered. Therefore, it can be said that the explained variance is depending on the product character, but not on the usage mode alone. This leads to the rejection of Hypothesis 3. The explained variance of Balanced TAM varies with the product character but not with the usage mode, if the product character remains unconsidered.

Furthermore, it was expected that the explanatory power of Balanced TAM is best for hedonic products in action mode (Hypothesis 3a) and worst for utilitarian products in goal mode (Hypothesis 3b). Table 15 gives an overview over the explained variance of all studies separated according to the usage modes. The overall explained variance of Balanced TAM was best for the dual use product in the laboratory condition and worst for the utilitarian

product in action mode. Because the hypotheses refer to the explanatory power during different usage modes, the analyses is restricted to the differentiation between pre-usage, action, and goal mode, because these modes were included in all studies. Then, Balanced TAM was actually best in predicting the action mode for hedonic systems and therefore, the Hypothesis 3a is verified. In contrast, Balanced TAM is still worst for utilitarian products in action mode which leads to a rejection of Hypothesis 3b.

Hypothesis 4a assumes that the product character is more important for determine technology acceptance of products with extreme product characters (hedonic and utilitarian products) than the usage mode, whereas the usage mode ought to be more important than the product character for dual use products (Hypothesis 4b). Significance tests revealed no difference between the explained variance of Balanced TAM for any of the usage modes for dual use products. Therefore, Hypothesis 4b has to be rejected. On the other hand, no significant differences were found between the explained variance in action and goal mode for the hedonic and utilitarian product. Consequently, Hypothesis 4a is verified. Overall, it seems that the explained variance depends more on the product character than on the usage mode. Therefore, Hypothesis 4 has to be rejected.

4.5.2 Hypothesis on Product Character

One of the assumptions was that the explanatory power of the hedonic (Hypothesis 6) and pragmatic (Hypothesis 5) qualities depends on the product character. To test these hypotheses, it is investigated if the same hedonic and pragmatic qualities are important for the explanation of technology acceptance in each study. Table 14 provides an overview.

Table 14: Overview of the relevant impact factors for technology acceptance divided according to the studies.

study	mode	Perceived usefulness	Perceived ease of use	Perceived enjoyment	Identification	Stimulation
Wii Motion Plus ™	Goal	n.s.	.05*	.05*	.001***	n.s.
	Action	n.s.	.05*	.001***	.001***	n.s.
Apple iPad ™	Goal	.05*	.05*	.01**	.05*	n.s.
	Action	n.s.	.05*	n.s.	.05*	.05*
Ricoh Aficio 3350™	Goal	.05*	n.s.	.01**	n.s.	n.s.
	Action	.01**	n.s.	n.s.	n.s.	n.s.

As can be seen in Table 14, *perceived ease of use* is always a relevant predictor for hedonic and dual use products but never for utilitarian products. On the other hand, *perceived*

usefulness is always relevant for utilitarian products, sometimes for dual use products but never for hedonic products. Therefore, Hypothesis 5 is verified.

Similar things can be said for the hedonic qualities. *Perceived enjoyment* was always relevant for hedonic products and sometimes for dual use and utilitarian products. *Identification* was a very strong predictor for hedonic products, a good predictor for dual use products and no predictor for utilitarian products. By contrast, *stimulation* was only sometimes relevant in the context of dual use products. Therefore, the influence of the hedonic qualities also depends on the product character. The Hypothesis 6 is verified.

4.5.3 Hypothesis on Usage Mode

It was expected that the explanatory power of the hedonic and the pragmatic qualities depends on the usage mode (Hypothesis 7), with hedonic qualities being more important in action mode (Hypothesis 7a) and pragmatic qualities being more important in goal mode (Hypothesis 7b). Looking at Table 5, Table 9, and Table 13, it becomes clear that hedonic qualities were not always more important than pragmatic qualities in action mode. The same accounts for pragmatic qualities in goal mode. Therefore, it cannot be assumed that a matching of usage mode and influence factor is possible without considering any other relevant influence factors like product character. The Hypothesis 7a and Hypothesis 7b have to be rejected. Even though the directed hypotheses H7a and H7b have to be rejected, differences in *technology acceptance* between the usage modes occurred. Therefore, it has to be concluded that the explanatory power of the hedonic and pragmatic qualities does depend on the usage mode, even if the dependency is not the expected one. In line with this, Hypothesis 7 is verified.

Table 15: Explained variance (in %) of technology acceptance compared between revised and Balanced TAM for all studies.

	Study									
	Wii Motion Plus™			Apple iPad™			Ricoh Aficio 3350™			
Mode	Revised TAM	Balanced TAM	difference	Revised TAM	Balanced TAM	difference	Revised TAM	Balanced TAM	difference	Mean explained variance of Balanced TAM
Pre-usage	58.2%	74.6%	+16.4%	42.2%	65.8%	+23.6%	53.5%	48.6%	-04.9%	63.0%
Goal	50.6%	75.8%	+25.2%	46.6%	70.7%	+24.1%	40.6%	49.7%	+09.1%	62.4%
Action	60.8%	79.1%	+18.3%	48.6%	58.3%	+09.7%	40.7%	37.7%	-03.0%	58.3%
Online	61.3%	78.2%	+16.9%	-	-	-	-	-	-	-
Diary	-	-	-	66.3%	72.5%	+06.2%	-	-	-	-
Laboratory	-	-	-	63.3%	82.7%	+19.4%	-	-	-	-
mean	57.7%	77.0%	+19.2%	53.4%	70.0%	+16.6%	44.9%	45,3%	+00.4%	61.2%

4.6 Summary of Results

Within this thesis three studies were conducted to test whether the developed research model – Balanced TAM – is better in explaining technology acceptance for hedonic and dual use products than revised TAM (Heijden, 2004; Chesney, 2006). Overall, 23 hypotheses were investigated within this thesis. The results of all hypotheses divided according to the studies can be seen in Table 16. A graphical overview over all standardised β-weights for each study and each point in time can be found in Figures Figure 16, Figure 17 and Figure 18.

Summarising, it can be said that all studies confirmed the assumption that *attitude* towards usage and behavioural *intention to use* can be integrated to one measure of *technology acceptance*. Furthermore, it can be said that Balanced TAM is a better model for predicting and explaining *technology acceptance* of hedonic and dual use products than revised TAM. On the other hand the explanatory power of Balanced TAM does not significantly decrease for utilitarian products compared to revised TAM. Restricting the analyses to the usage modes that were implied in all studies (pre-usage, action and goal mode) it becomes clear that – as expected - Balanced TAM is best in explaining technology acceptance of hedonic systems in action mode. In contrast, Balanced TAM performs worst for utilitarian systems in action mode, too.

Overall, it seems that hedonic qualities are more important for hedonic products, whereas pragmatic qualities are more relevant for utilitarian products independent of the usage mode. All results will be discussed together in the next chapter.

Table 16: Graphical overview over all hypotheses tests. A check marks hypotheses that are accepted, a cross marks hypotheses that had to be rejected and strokes mark that hypotheses that were not checked within that study.

study	Hypotheses																					
	H1	H2 a	H2 b	H3	H3 a	H3 b	H4	H4 a	H4 b	H5	H5 a	H5 b	H5 c	H6	H6 a	H6 b	H6 c	H7	H7 a	H7 b	H8	H8 a	H8 b
Study 1: Wii Motion Plus ™	✓	✓	-	-	-	-	✗	✓	-	-	-	-	✗	-	✓	✓	✓	-	-	-	-	-	-
Study 2: Apple iPad ™	✓	-	✓	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✗
Study 3: Ricoh Aficio 3350™	✓	-	-	-	-	-	✓	✗	-	-	✗	✗	-	-	-	-	-	-	-	-	-	-	-
Comprehensive results	-	-	-	✗	✓	✗	✗	✗	-	✓	-	-	-	✓	-	-	-	✓	✗	✗	-	-	-

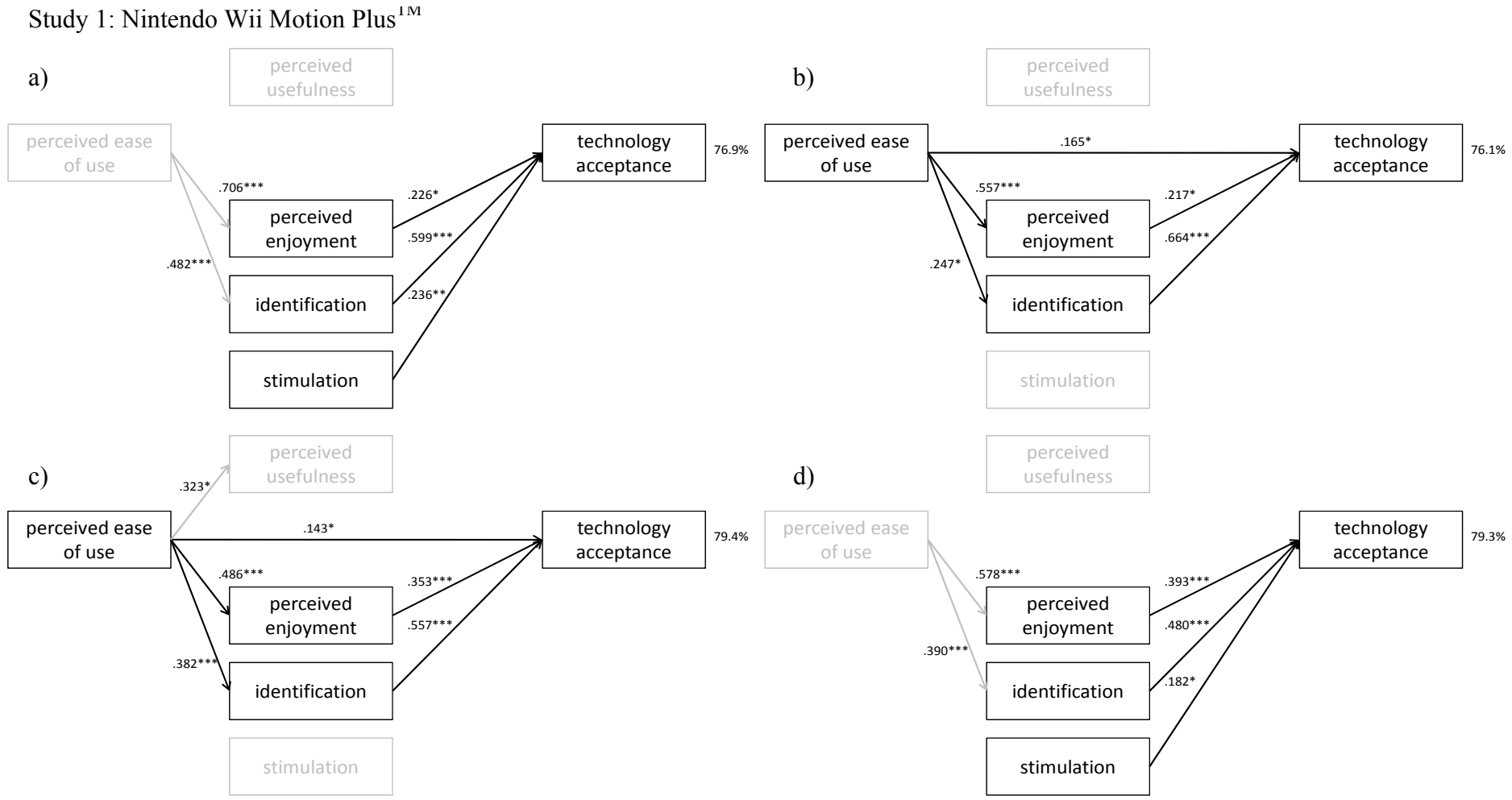
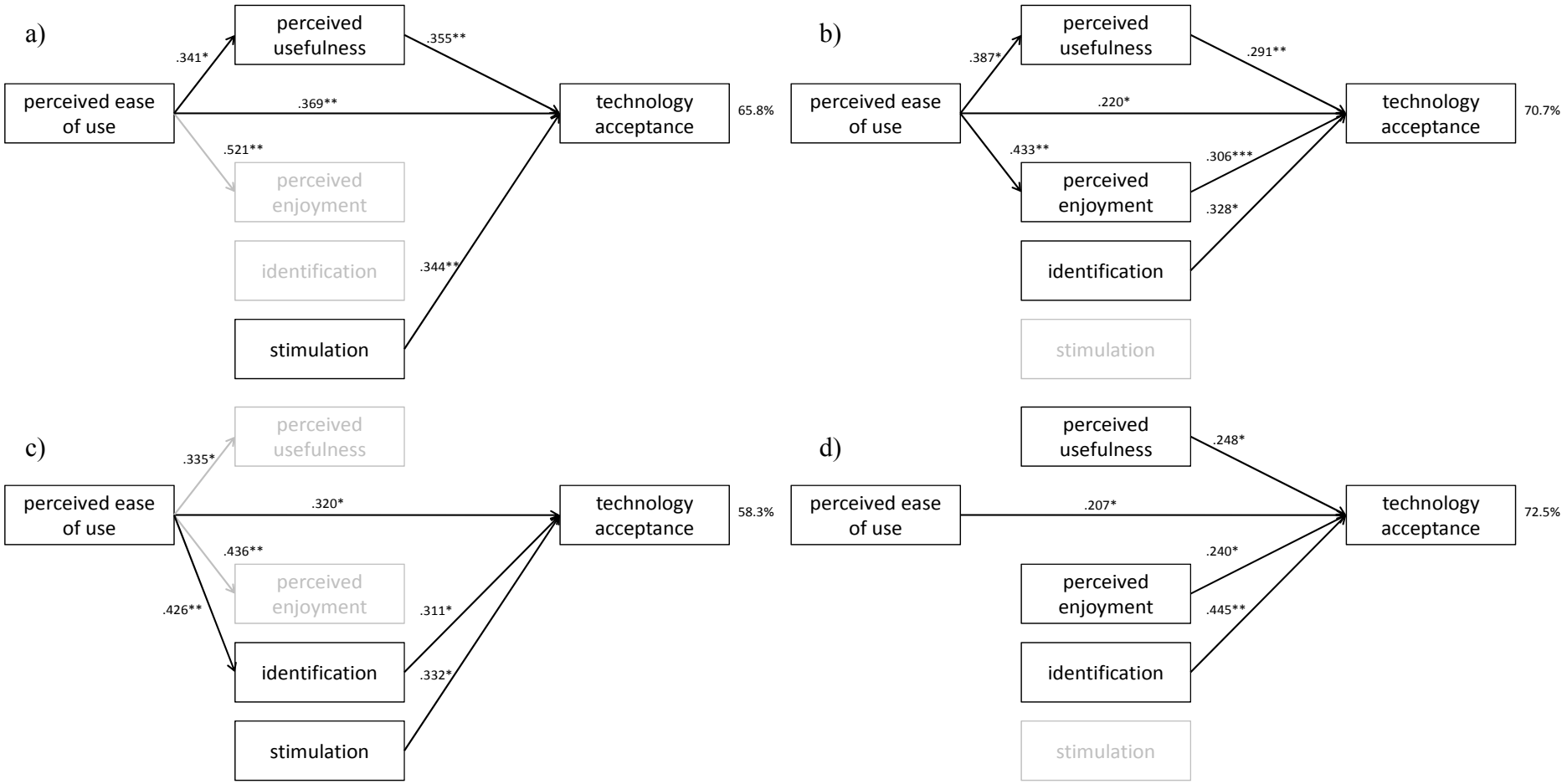


Figure 16: Results for Balanced TAM for Study 1 (Nintendo Wii Motion Plus™) in a) pre-usage mode b) goal mode c) action mode and d) online mode. Values on the connections are standardised β-values, percentages are adjusted R^2 of explained variance of technology acceptance.

Study 2: Apple iPad[1M]



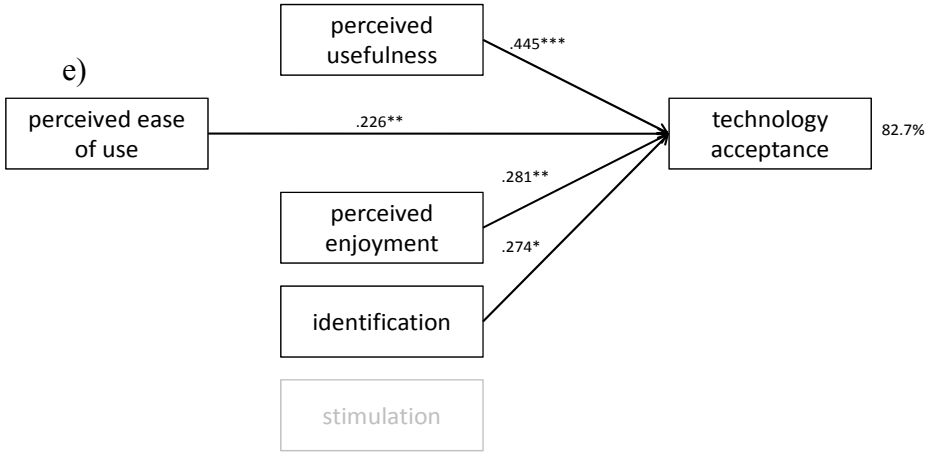


Figure 17: Results for Balanced TAM for Study 2 (Apple iPad^{TM}) in a) pre-usage mode b) goal mode c) action mode, d) diary mode, and e) laboratory test. Values on the connections are standardised β-values, percentages are adjusted R^2 of explained variance of technology acceptance.

Study 3: Ricoh Aficio 3350^{TM}

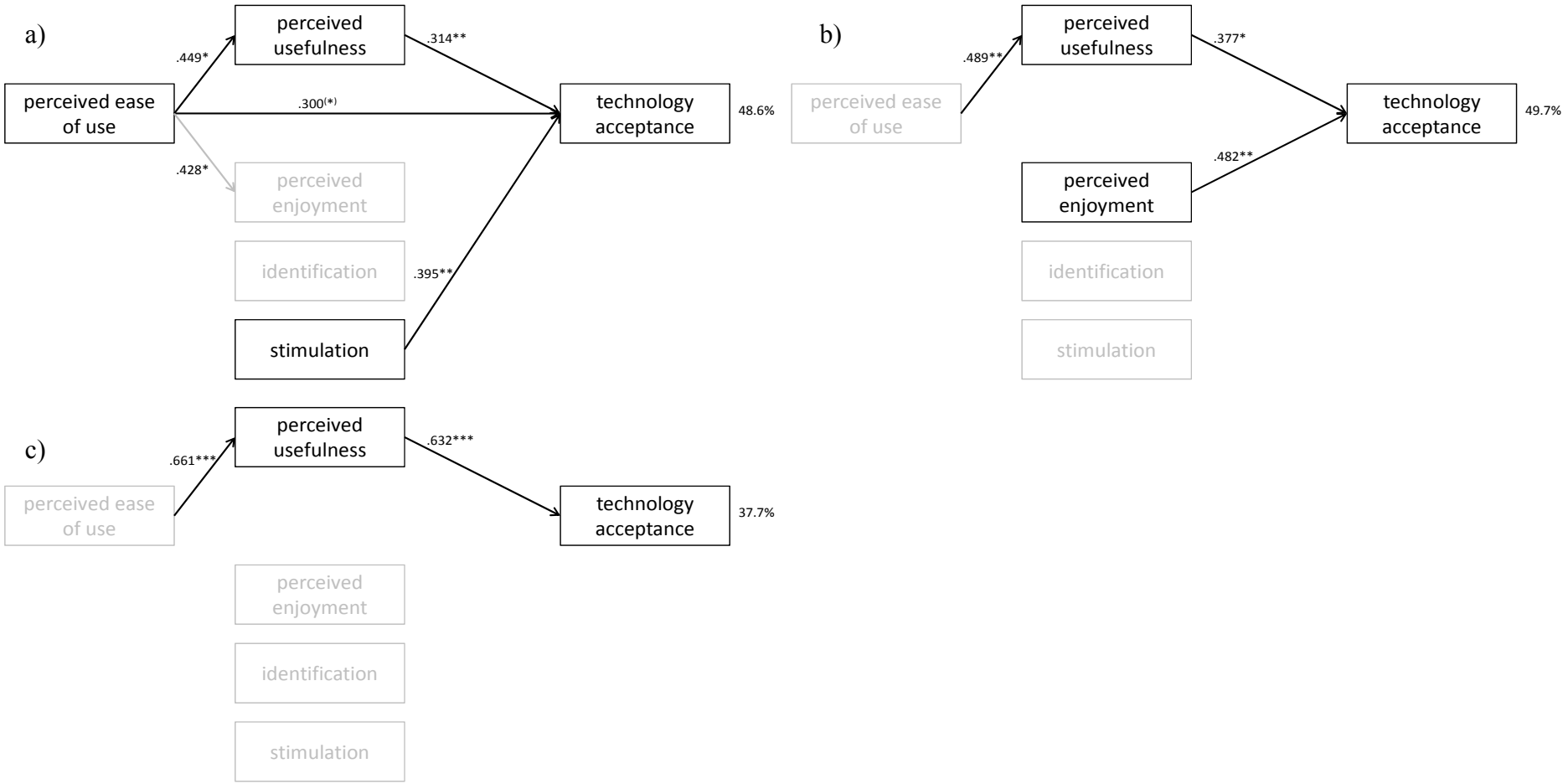


Figure 18: Results for Balanced TAM for Study 3 (Ricoh Aficio 3350^{TM}) in a) pre-usage mode b) goal mode c) action mode. Values on the connections are standardised β-values, percentages are adjusted R^2 of explained variance of technology acceptance.

5 Discussion and Conclusion

This thesis scope was threefold: re-defining *technology acceptance* for the context of hedonic and dual use products, developing and validating a model which is better suited to explain *technology acceptance* of hedonic and dual use products than existing models, and investigating which influence the usage mode has on the explanatory power of the Balanced TAM. Within this chapter it will be first discussed if and how far these aims were reached by discussing the results. Afterwards, the methodology and research approach will be discussed on a meta-level. This chapter closes with the conclusion.

5.1 Discussion of Results

After introducing the three empirical studies and evaluating the research hypothesis in the last chapter (Chapter 4) this section's scope is to discuss the results, to present the validated research model – the Balanced TAM – with its strength and weaknesses, and to closer define for which products it can be used.

Within this thesis a new definition of *technology acceptance* was introduced. Namely, *technology acceptance* was defined as positive attitude towards a certain technology in combination with the intention to use the technology. This assumption was tested within three empirical studies. All studies confirmed that seen from a methodical point of view the merging of *intention to use* and *attitude* towards usage cannot be falsified. Therefore, it is theoretically sound to use the combined measure. A question which was not answered by this thesis is whether a high degree of *technology acceptance* leads to prolonged usage or a confirmed buying intention, as it is often expected in organisational contexts (e.g. Davis et al, 1989). So by now, the re-definition of *technology acceptance* is well grounded from a methodological point of view but needs further affirmation with a special focus on the external validity of the construct. To address this open points a qualitative approach is necessary, which was not part of this work. Within this qualitative approach observable behaviours should be identified which relate to the constructs (e.g. performance measure for *perceived ease of use*). The occurrence of this behaviour should then be matched to the ratings on the TAQs scales to ensure the external validity of the scales. Additionally, it might be helpful to find observable behaviours that relate to the construct *technology acceptance* to enable a comparison of objective and subjective *technology acceptance*. Possible indicators of *technology acceptance* for hedonic and dual use products could be usage durations, whereby not absolute usage durations should

be in the focus of interest but relative usage durations. This means that the difference between intended usage duration and actual usage durations might be a hint for the acceptance, because hedonic products aim for prolonged usage (Chesney, 2006). For dual use products that are used in utilitarian settings classical acceptance measures (e.g. absolute usage durations, usage frequencies, number of tasks performed with that product) might be appropriate. Additional, the number of shifts between utilitarian and hedonic usage might be an indicator for the acceptance of the dual use product in total.

Another point was the development and validation of a research model, which is better suited for the prediction and explanation of *technology acceptance* for hedonic and dual use products. This was done by integration two existing models – namely the revised TAM (Heijden, 2004; Chesney, 2006) and parts of the hedonic/pragmatic model of user experience (Hassenzahl, 2007). During the three studies, it could be shown that all integrated constructs are necessary for the prediction of *technology acceptance*, if different usage modes are considered. Even if for hedonic products mainly *perceived enjoyment* and *identification* add explanatory value, this changes for dual use products. Here, *perceived usefulness* and *perceived ease of use* are almost as important as *identification*. Additionally, *stimulation* was also important for hedonic and dual use products even though it was not that important as the other impact factors for the prediction and explanation of *technology acceptance*. This implies that all constructs have to be kept for a well functioning technology acceptance model.

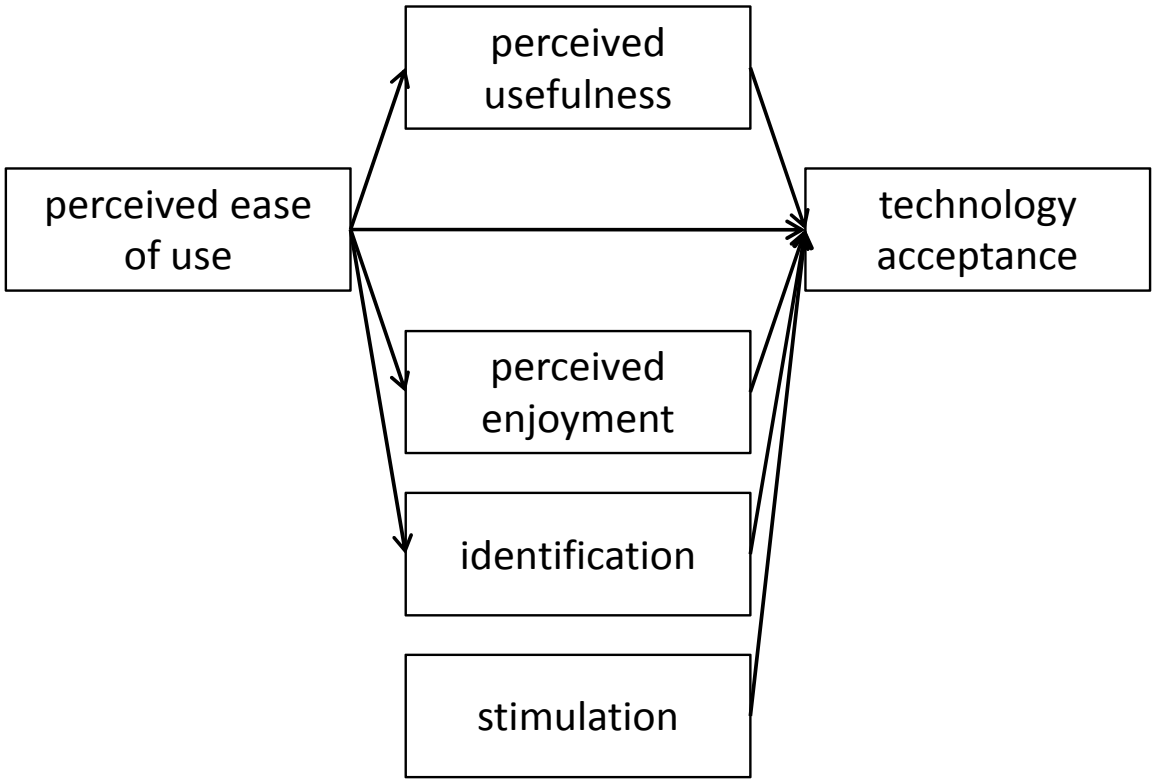


Figure 19: Validated Balanced TAM (cf. Kauer et al., in print).

Furthermore, it was expected that a combination of revised TAM (Heijden, 2004; Chesney, 2006) and *stimulation* and *identification* from the hedonic/pragmatic model of user experience (Hassenzahl, 2007) would lead to a significant increase of the explanatory power of the resulting model in comparison to existing models for the explanation of *technology acceptance* of hedonic and dual use products. This assumption was confirmed for all usage-modes for hedonic products and for the pre-usage and goal mode for dual use products. For action mode no difference between revised TAM and Balanced TAM was found. Looking at the descriptive measures (.486 vs. .583, cf. Table 15) it can be assumed that for a bigger sample this difference would have been significant, too. Balanced TAM explained 10% more variance of *technology acceptance* than revised TAM did. In contrast, Balanced TAM did not improve the explanatory power for utilitarian products. This is conforming to the expectations, because all added constructs were chosen due to their expected capability to explain the hedonic usage of a product. Therefore, none of the constructs included any utilitarian aspects. Together, this leads to the conclusion that Balanced TAM is a well-suited model for the investigation of hedonic and dual use products, but should not be used for utilitarian products. Instead, revised TAM (Heijden, 2004; Chesney, 2006) seems more appropriate because it reaches the same explanatory power than Balanced TAM with less constructs. In the case the best prediction and explanation of *technology acceptance* is aimed for, the use of a "special-

ised" model like UTAUT (Venkatesh et al, 2003) or TAM 3 (Venkatesh & Bala, 2008) is recommended. Still, the applicability of Balanced TAM is also restricted for hedonic and dual use systems. Within this broad field of products the model can only be used for the explanation of non-safety critical products which excludes some very famous dual use products (e.g. cars). It can be expected, that even for safety critical products *identification* plays an important role but several main aspects of technology acceptance in this area (e.g. trust, safety, and reliability) remain unconsidered within this thesis. Therefore, an adaptation of this model for safety critical products would be necessary to get a reliable picture of *technology acceptance* of those products.

Regarding the usage modes it can be said that the influencing factors on *technology acceptance* vary between different usage modes. *Stimulation* for example was a significant predictor for all products in the pre-usage condition, whereas in most other usage modes, it did not play a major role. Comparing the action and goal mode in the first study (Nintendo Wii Motion Plus™), it becomes clear that the impact factors remain constant. A similar picture can be seen in study three (Ricoh Aficio 3350™), with the exception of *perceived enjoyment* who was an additional explanatory factor in goal mode. In contrast, in study two with the dual use product (Apple iPad™) only one impact factor remain constant (*perceived ease of use),* whereas all the others change according to the usage mode. This implies that for the prediction of *technology acceptance* of dual use products the usage mode has to be considered to identify the relevant impact factors, whereas for quite clear product characters (mainly hedonic or pragmatic) the usage mode does not play a major role and the impact factors remain constant. Summarised, it can be said that before having interacted with a product, the anticipated novelty of the product leads to a high acceptance (combined with different factors like anticipated usefulness, anticipated ease of use, and anticipated identification depending on the product character), whereas after the interaction other factors are more important (e.g. the ability of a product to reflect the owners personality) for the acceptance of a product. At this point, it is important to notice that the absolute appraisal of the product on each scale does not vary between the usage modes (same descriptive measures for each scale). Therefore, it can be assumed that the perception and appraisal of the product qualities is independent of the usage mode, whereas the weight of this appraisal is heavily depending on the usage mode (cf. Goodhue & Thompson, 1995 for the importance of product and task fit). This might be true, even if the influencing factors did not vary between the usage modes for the clearly hedonic or utilitarian product. A possible explanation is that even if both usage modes were imple-

mented the product character of clearly hedonic or utilitarian products is so forcing that even tasks or free usage is seen in the light of the product character.

Besides the main points of this thesis the question whether pragmatic qualities can be seen as hygiene factors in the context of hedonic products was addressed within Study 1. The results imply that this is not the case, because neither a low rating lead to a decreased *technology acceptance* (*perceived usefulness*) nor a high rating influenced the *technology acceptance* (*perceived ease of use*) as expected. An analysis of the multi co-linearity led to the conclusion that it is not a methodological problem. Therefore, the current findings suggest that for extremely hedonic products *perceived usefulness* is not important at all and that a lack of "sense" is accepted or at least that the sense of a hedonic product is defined by the hedonic qualities of the product instead of its usefulness for utilitarian goals. By contrast, a high *perceived ease of use* is still necessary for a high *technology acceptance* of hedonic products. This might be, because a high *perceived ease of use* supports the interaction between user and products and thereby facilitates the rise of positive emotions.

One unexpected point was the high impact of *perceived enjoyment* on the *technology acceptance* of the utilitarian product in goal mode during Study 3. This might be due to the tasks the users were confronted with (see Appendix I). Those tasks were quite complicated things that are not often done with a multifunctional device (e.g. copy 4 pages on one page together). Perhaps, the exploration of new functions was enjoyable to the users.

As mentioned in chapter 2.1 the perceived product character is heavily depending on the individual who judges the product and on the task the individual wants to perform. Therefore, a shift in the perceived product character of a dual use product over time is likely, but was not observed within any study (no significant differences between the ratings of the constructs in goal and action mode). This leads to the assumption that the product character is at least stable for short usage periods, but no statements can be made about the stability of the perceived product character over a longer period of time. This has to be investigated within longitudinal studies and for dual use products in special, because they easily offer different possible perceived product characters to the users.

The next section (chapter 5.2) will focus on the methodological discussion on a meta-level.

5.2 Discussion of Methodological Approach

Scope of this thesis was the re-definition of *technology acceptance,* the development and validation of a technology acceptance model for hedonic and dual use products, and the consideration of the usage modes. The model development started with a theoretical definition of the main constructs, followed by the consideration of theories and models that aim to explain and predict technology acceptance in different areas. Due to its economy and high degree of former validation the Technology Acceptance Model (Davis et al., 1989) in its revised version (Heijden, 2004; Chesney, 2006) was chosen as basis for the model development. Because the new model aims for the explanation of technology acceptance of hedonic and dual use products an extension of the model in this direction was necessary. The hedonic/pragmatic model of user-experience (Hassenzahl, 2007) was chosen as extension. Therefore, the revised TAM (Heijden, 2004; Chesney, 2006) and the hedonic/pragmatic model of user experience (Hassenzahl, 2007) were combined to the so-called Balanced TAM (Kauer et al., in print).

A first empirical validation of Balanced TAM was conducted with the help of three empirical studies. Whereby Study 1 used a hedonic product as object of examination – the Nintendo Wii Motion Plus™ -, Study 2 used a dual use product – the Apple iPad™ -, and Study 3 used an utilitarian product – the Ricoh Aficio 3350™.

The self developed Technology Acceptance Questionnaire (TAQ) was used for all three studies. An analysis of the internal consistency showed good results for all constructs except *stimulation*. As discussed in the results section, this is due to the split nature of the construct *stimulation. Stimulation* consists on the one hand of novelty in the product which leads to curiosity and prolonged used and on the other hand of a perceived increase in competence. Because the Wii Motion Plus™ was used as the object of examination, it can be assumed that the novelty ratings were quite high, whereas the competence ratings were relatively lower. This was confirmed by statistical analyses, which showed that the mean values of both aspects differed highly significantly at each point in time (T_1 = 7.156, df = 67, p = .001***; T_2 = 9.719, df = 67, p = .001***; T_3 = 10.846, df = 67, p = .001***; T_4 = 9.195, df = 67, p = .001***). Therefore, a high Cronbach's α cannot be expected and the low value is not considered problematic. Still, future studies should investigate whether a high Cronbach's α is reached when a product is investigated which is perceived to be high on both aspects.

Even if the scale *identification* performed well in terms of internal consistency it should be mentioned that – as for all other scales – most items measured the outcome of the user-product interaction in total (overview over the degree of *identification*) but that one item was integrated ("The system meet my needs"), that included a sub-measure of *identification*. For future studies all items should be formulated on the same abstraction level which might be done by excluding this single item or adding items for each sub-scale. Furthermore, the measures of *identification* included two different aspects of communicating the self: on one site the aspect of identifying oneself with a group was addressed, on the other site the aspect of being special and unique was addressed. It can be assumed that for being special those attributes mentioned by Tzou and Lu (2009) – namely expensive, socially visible and personalised – are more relevant than for those products that are used for fulfilling the need for relatedness. Following, it could be argued that those products that are used because they are expensive, socially visible, and personalised are mainly used to gain reputation and to improve the own status in the social system. This is reflected by Belk (1988, p. 139) who argues "that we are what we have [...] is perhaps the most basic and powerful fact of consumer behaviour". In contrast, those attributes are not able to explain the success of some groups of products (merchandise articles of soccer clubs, humorous t-shirt prints etc.). Even if they are mostly socially visible, they are not expensive and seldom personalised. There are even some products that are bought because of the values they reflect when they are not socially visible and it can be assumed that they are accepted because they are used as expression of important parts of the self (e.g. wearing a chain with a cross underneath the closes). By now, neither market research with the "we are what we have" concept nor technology acceptance researchers are able to explains those aspects of product acceptance and they should be addressed in future studies.

An additional methodological problem occurs when considering the items with which *attitude* was measured within the self developed Technology Acceptance Questionnaire. Those 2 items were "I have a positive attitude towards the usage of such a system" and "Overall, I find the system good." This integrates 2 different kinds of attitude, namely the *attitude towards usage* and the attitude towards the product itself. Within a meta-analysis Zhang, Aikman and Sun (2008) were able to show that the *attitude towards usage* influences the *intention to use* a product, but not the *attitude towards the product*. Within the herein presented studies both attitudes were always highly correlated with each other and the combined scale had a good Cronbach's α but this is not necessarily the case for all kinds of products, especially not in mandatory settings. Therefore, additional measures for *attitudes towards*

usage should be integrated into the Technology Acceptance Questionnaire. This might be vital in a context were dual use products are used on a mandatory basis.

A more critical point is the consideration of the external validity of the measures. It was shown that the measure for *perceived ease of use* is sensitive for perceived changes in the ease of use during the interaction with the product (bad performance leads to lower ratings), but up until now, no other construct was investigated according to its external validity. For the construct *perceived enjoyment* and *perceived usefulness* validity can be assumed, because both measures were used – in a slightly different version – in multiple studies before (e.g. Moon & Kim, 2001; Heijden, 2004, Chesney, 2006). Only the rewording of the scales *identification* and *stimulation* needs further investigation, which should be part of future studies. Additionally, the external validity of *technology acceptance* as combination of *attitude* and *intention to use* should be investigated, as mentioned in the discussion of the results.

All three studies which provide evidence to the assumption that *technology acceptance* can be seen as combination of positive *attitude* and the *intention to use* the product, but in literature the so-called "intention-behaviour-gap" (Bhattacherjee & Sanford, 2009) is discussed to explain the occurring difference between behaviour and intention. As discussed in Chapter 2.2, actual usage – especially the usage of hedonic products - might be hindered by numerous external reasons (e.g. time budget considerations) without lowering the acceptance of a product. This obstacle can be partially explained by a lack of justification for the usage of hedonic products (cf. Diefenbach & Hassenzahl, 2008; Diefenbach, 2012). By contrast, it can be assumed that a utilitarian product which is not used over a longer period of time is not accepted, even for tasks in which it would be helpful. Therefore, it has to be assumed that this measure of *technology acceptance* is most appropriate in the context of hedonic products in general and voluntary usage in specific. Transferring this definition with its empirical verification to organisational and/or mandatory settings might be to short-sighted. Because Study 3 was no field study, the absence of contradictory results does not necessarily verify the definition. No economical loss was associated with the further usage or non-usage of the product. In organisations, success of a product would be measured with actual usage, whereas in the consumer market the purchase of a product – combined with the willingness to buy the product again - is seen as success.

Additionally, it is questionable if the product (Ricoh Aficio 3350^{TM}) for the utilitarian study was well chosen. In Table 16 it is shown that almost all hypotheses had to be rejected for utilitarian products. One possible explanation for this is an inadequate product choice for

the study. It is questionable whether or not *identification* would play an important role for the prediction of *technology acceptance* as well, if the investigated product would have been more visible and personal than a multifunctional device. For a feeling of *identification* it is important that the possessions are socially visible, expensive, and generally personalised (cf. Tzou & Lu, 2009). The multifunctional device used in Study 3 might have been expensive, but to no means, it was socially visible or personalised. Quite the contrary was the case: a product was investigated, which is normally bought by companies instead of single persons and which is used alone. Due to safety requirements, multifunctional devices are often placed in separate rooms and thereby, the usage is often not noticed by others. Additionally, a personalisation of the multifunctional device is not possible and is often not even aimed for, because it is not the property of the user. The choice of a private utilitarian product would have been more appropriate. What exacerbates the situation is the fact that the selection of a private purely technical utilitarian product is not easy. Even products which were formerly considered to be purely utilitarian (e.g. coffee machines, printers) are now advertised with respect to hedonic qualities. A good example of this would be a coffee machine by Nespresso™. On their homepage (Coffee Machines: Nespresso, 2012) those machines are described as following: "The Nespresso coffee machines are both beautiful in design and simple to use. More importantly, they are the only machines capable of revealing the true character and rich aroma of the coffee contained in each capsule." Nevertheless, the Nespresso™ machines are still coffee machines and even if the user is delighted by the design and the lifestyle those machines provide, it is unlikely that someone uses the machines just to spill out the coffee afterwards. Therefore, it can be assumed that it is still a utilitarian product that is only used in cases in which a pragmatic goal (making coffee) has to be reached, but that this utilitarian product additionally evokes positive emotions in its usage. Consequently, it has to be assumed that hedonic qualities do also play a role in the usage of utilitarian products, even if this role might be subordinated to pragmatic goals (e.g. making a coffee). Then, it is questionable if the results found in the herein presented study on utilitarian products can be applied to utilitarian products in private usage settings. Instead, it can only be assumed that at least for mainly utilitarian company property the *identification* does not play a major role, as long as the user is not seen together with this property. And additionally, it can be assumed that the categorisation of products will become even more complex in future.

One of the explicit aims of this thesis was the development of a model which is able to predict technology acceptance before expensive failed ventures. Therefore, each study in-

cluded a so-called pre-usage mode, which included the anticipated measure of *technology acceptance* after an introducing advertisement but before direct interaction with the product. The results show that for each product character the anticipated technology acceptance and the according impact factors differ from real usage conditions. It has to be assumed that it is impossible to predict the *technology acceptance* appropriately without an interaction between user and product. This is likely due to common appraisal strategies, which use anchoring and adjustment (Tversky & Kahneman, 1974). Anchoring and adjustment are part of the human decision making process. "In the absence of specific knowledge, the [decision making] heuristic suggests that individuals rely on general information that serves as an 'anchor' and, in fact, individuals are often unable to ignore such anchoring information in decision making processes. As soon as additional information becomes available (e.g. from interaction with the product), individuals tend to adjust their judgments to reflect the new information, but still rely on the initial anchoring criteria" (Venkatesh, 2000, p. 345 f). Anchors might be for example former experiences or word of mouth from third persons. This leads to the conclusion that for the evaluation of products in early stages a prototype should be provided and an interaction between user and product is essential. Still, the operational definition of the anticipated *technology acceptance* was useful, because it shows that the anticipated *technology acceptance* differs from the "real" *technology acceptance* during and after usage. The main differences are not the extent of explained *technology acceptance,* but the impact factors. Therefore, it is advisable for advertisements to highlight also those aspects that contribute to the anticipated *technology acceptance* and not only those that contribute to the *technology acceptance* during and after usage.

A general problem of all studies was the restricted number of participants. Overall, 140 people participated in the studies. Despite Study 2, most participants were students. It is questionable if all results can be transferred to a complete population, because it could be that students are an extremely "hedonic" group (cf. Lester & Leach, 1983). Still, the fact that the results of Study 2 (Apple iPad^{TM}), in which almost 50% of the participants were non-students, are conforming to the findings of Study 1 gives a good hint on the appropriateness and transferability of the results. Besides, all studies aimed for a counterbalancing of male and female users as well as for a wide range of age. Still, the low number of participants led to an investigation of the Balanced TAM with the help of regression analysis. The validation of the Balanced TAM with structural equation models would be desirable.

After having discussed the results of the study, the next section will give a summarising conclusion of this thesis.

5.3 Conclusion

As mentioned at the beginning of this chapter this thesis scope was threefold: 1. re-defining *technology acceptance* for the context of hedonic and dual use products, 2. developing and validating a model which is better suited to explain *technology acceptance* of hedonic and dual use products than existing models, and 3. to investigate which influence the usage mode has on the explanatory power of model.

It can be said that this thesis succeeded in re-defining *technology acceptance* for the context of hedonic and dual use products. An easy to use and theoretically well founded measure was developed and applied, which appeared to work well for measuring *technology acceptance,* even though the approval of the external consistency of the measure is still pending.

Additionally, the Balanced TAM proved to be a model which is able to explain and predict *technology acceptance* better than existing products. This additional power is reached by integrating the factors *identification* and *stimulation* into revised TAM. Overall, five different factors were used to predict and explain *technology acceptance*: *perceived usefulness, perceived ease of use, perceived enjoyment, identification,* and *stimulation.* Combined with the measures for *intention to use* and *attitude* towards usage, it is a very economical model. Only 23 items were applied to measure all constructs. Still, Balanced TAM was able to explain up to 82.7% variance (laboratory test condition in Study 2: Apple iPad^{TM}), which makes the model not only economical, but also powerful in comparison to earlier models (e.g. revised TAM reached 35% in the study of Heijden, 2004). Nevertheless, Balanced TAM should only be applied for hedonic and dual use products, whereas for the prediction and explanation of *technology acceptance* other models like revised TAM (Heijden, 2004; Chesney, 2006), UTAUT (Venkatesh et al., 2003) or TAM 3 (Venkatesh & Bala, 2008) should be used.

A final benefit of this thesis was the investigation of the importance of the usage modes for different product characters. It was shown that for easy to categorise products (mainly hedonic or mainly utilitarian) the usage mode (action vs. goal mode) is not very important and the impact factors remain quite constant between different modes. In contrast, usage modes have shown to be extremely vital for the appraisal of dual use products. As expected, hedonic qualities were more important in action mode and pragmatic qualities were

more important in goal mode. Due to the fact that most products can be categorised as dual use products those finding have implications for the development and promotion of most products. Still, it was shown that the pre-usage conditions differs significantly to the usage conditions for all products. Therefore, it is essential to differentiate between anticipated *technology acceptance* and *technology acceptance* during usage situations.

Even if this thesis was able to contribute to the state of art in the field of technology acceptance research, some questions remain unconsidered. Those questions and the implication for research and application will be highlighted within the next chapter (Chapter 6).

6 Outlook on Future Work

Although this thesis was able to advance the state of the art there are some open points that have to be clarified in future research. Those points will be presented in the first section. Afterwards, the implications of this thesis for application will be presented.

6.1 Implications for future research

All herein presented studies investigated the appropriateness of the new definition of *technology acceptance* and Balanced TAM. This was always done within laboratory experiments and within one-time measures. A model investigation in field studies over a longer period of time would be helpful in multiple ways: it would allow for an investigation of the external validity of the new defined construct *technology acceptance,* it would enable a dynamic investigation of the impact factors to test whether the importance of some of them is decreasing or increasing over time, and it would integrate the social aspect explicitly, which should be considered very vital due to the fact that *identification* was identified as important impact factor that is – at least partially - depending on its social visibility (Tzou & Lu, 2009).

Furthermore, within these studies the users were confronted with tasks, but not with complete usage scenarios. Therefore, the user's role was not explicitly defined. Again, this role is considered to be relevant, because for communicating a user's personality and values it has to be clear which personality should be communicated. According to Brewer (1991), a person's self can be divided into a personal identity and social identifies. This means, that the picture of the self changes with respect to the social context. Therefore, it can be assumed that the personality which should be communicated also changes with the social context. Especially for dual use products, an investigation of how the private self and the working self should be communicated and how a technical product can support this communication is of interest.

Additionally, future studies should aim at further elaborating the construct of *identification* and to find out if the construct consists of different sub-constructs. By now, the impact factors on *perceived usefulness* (TAM 2, Venkatesh & Davis, 2000) and *perceived ease of use* (TAM 3, Venkatesh & Bala, 2008) are well-known but this is not the case for *stimulation* and *identification*. By now, the applied measures are reflective and do only show the perceived extend to which the product is able to express the self. Because of the strong influence of *identification* on technology acceptance, methods have to be developed that allow using this

finding in the development of products. Therefore, future research should focus on investigating how products can be used for communicating the self. For the construct *identification* a further elaboration should concentrate on different levels of expressing the self and how they do influence technology acceptance. Possible levels might be identification as means for enhancing the own position in the social system (status; focussing on social aspects with the objective to distinguish between me and others; cf. Schultz Kleine, Kleine III, & Allen, 1995), identification as pure reflection of the self (belonging; focussing on the reflection of self; no need for social response to the product; cf. Zimmerman, 2009 for the quite similar concept of "role enhancement"), and identification as possibility to come into contact with potentially relevant others (relatedness; aims for a social response to the product choice of similar individuals; cf. Kleine III, Kleine, & Allen, 1995; Baumeister & Leary, 1995). Those sub-constructs could then be used to better understand and explain the acceptance of products that are neither expensive, nor socially visible or personalised. In a first step, this idea for sub-constructs should be elaborated and methods have to be developed to test these constructs. For the method development it would be desirable to develop items for all constructs and sub-constructs that can be used for a path-analytic evaluation of the model. Later on, it has to be investigated if all those possible sub-constructs do still relate to the need to belong (Baumeister & Leary, 1995), or if e.g. the expression of status is more related to utilitarian outcomes.

By now, the Balanced TAM is based on three user studies, one of them not even with a hedonic or dual use product. A broader model validation with more products and more participants would be desirable. Additionally, the Balanced TAM should be investigated for socially visible utilitarian products to see, whether the explanation of *technology acceptance* can be improved in this context by the addition of *identification*.

6.2 Implications for application

One of the major findings of this thesis was the fact that *identification* influences to a great extent the *technology acceptance* of hedonic and dual use products. Because *identification* was conceptualised as the perceived extend to which a products enables the communication of the self it becomes vital to integrate this aspect into the product development. For designers this step was often done by intuition. These results do now help to justify design decision on a scientific basis, if methods are applied that aim to assess the user personality. By contrast, engineers do often stick to development processes instead of intuition. According to the DIN EN ISO 9241-210 the usage context is investigated for the deduction of require-

ments. This includes looking at the user and user groups, looking at the tasks, and looking at the physical, social, organisational, and environmental context. But to no means, it involved looking at the self-concept of the users and looking at the ideal self in the different social contexts. This should become an inherent part of the context analysis and therefore, methods for application contexts should be developed that enable an easy assessment of the self-concepts. Future products should not only reflect the consumers self by chance, but should intentionally do so and therefore, this consideration of self-concepts should be formally integrated into user-centred design processes to guarantee a consideration even for products that follow an official process. A challenge of this consideration for designers will be the existence of different self-concepts that vary according to the context (Brewer, 1991; Kleine, Kleine, & Kernan, 1993; Zimmerman, 2009). Therefore, the main tasks will be to find out how different self-concepts can be communicated by a single product. This will be especially important for dual use products that do not only change because of the context but additionally because of the usage mode. Zimmerman (2009, p.403) tried to develop design patterns that aim to develop products that make "someone feel [that] they are becoming the person they desire to be in a specific role", but failed to provide general design aids. Additionally, this approach aimed at supporting people to develop their selves instead of expressing and communicating their selves. Therefore, it should be investigated how future products and developments processes can support the user in its expression of identification, not from a personality forming perspective but from a personality communicating perspective.

Additionally, the differences between the usage modes for dual use products enable coordination between the real life presentation of a product (e.g. in a playful way with slogans that promote the exploration of the product vs. a rational presentation which stresses possible tasks that are supported) and the presentation of the products in advertisements. This coordination should lead to a higher *technology acceptance*, because it might help to ensure that users use the product in the desired way, which leads to a match of expectations and using experience. Still, it has to be considered that the absolute ratings for the products qualities did not vary between the usage modes. Therefore, it can be assumed that the product perception is immediately and quite stable and that for dual use products it is vital to consider all qualities in the development process, because this rating will not be changed afterwards and bad ratings will influence the acceptance of a product negatively.

In contrast, it might be helpful to notice that *stimulation,* most likely the perceived novelty of a product, has an impact on *technology acceptance* before a direct interaction be-

tween user and product took place. This can be considered in advertisements, too, for example by stressing the new features (utilitarian products) or the unique elements of a product in general (hedonic and dual use products).

This thesis closes with a summary of the complete work, which will be presented within the next chapter (Chapter 7).

7 Summary

7.1 Summary

The rising importance of hedonic and dual use products is well noticed in literature, but up until now not appropriately addressed in technology acceptance research. Financial losses and dissatisfaction are the outcomes of this omission. Therefore, this thesis addressed this area by investigating three main research points: re-defining technology acceptance for hedonic and dual use products, developing and validating a model which predicts and explains *technology acceptance* better than existing models, and investigating the role of the usage mode for *technology acceptance*.

First, *technology acceptance* was re-defined as positive attitude towards a certain technology in combination with the intention to use the technology. Then, different technology acceptance models were investigated and judged according to their appropriateness for explaining technology acceptance in the context of hedonic and dual use products. The revised TAM was chosen, because it was already used in the context of hedonic systems and proofed to be better than models that do not integrate hedonic qualities. It was aimed for the improvement of this model due to the still low explanatory power of the model. This improvement was found by investigating different needs as basis for positive emotions during the interaction with products. Stimulation, competence, and identification were identified as most promising needs. Those needs were already part of the hedonic/pragmatic model of user experience, which led to the decision to merge both models into one combined model. The resulting model was called Balanced TAM.

Three user studies were conducted to test the validity and explanatory power of the model. It was shown that Balanced TAM explains significantly more variance of technology acceptance than revised TAM for hedonic and dual use products. Additionally, it did not perform worse for utilitarian products. The results and the methodological approach were discussed and open points identified. Those points were addressed in the future work section at the end of the thesis.

7.2 Zusammenfassung

Die steigende Bedeutung hedonistischer und dualer Produkte wird vielfach in der Literatur aufgegriffen, dieser Punkt jedoch bisher nur ungenügend in der Technikakzeptanzforschung berücksichtigt. Finanzielle Verluste und Unzufriedenheit sind die Ergebnisse dieses Versäumnisses. Daher adressiert die vorliegende Arbeit diesen Bereich durch die Untersuchung von drei Forschungsschwerpunkten: Durch die Neudefinierung des Begriffes Technikakzeptanz für den Bereich hedonistischer und dualer technischer Produkte, durch die Entwicklung und Validierung eines Modells, das besser als existierende Modelle die Technikakzeptanz hedonistischer und dualer technischer Produkte erklärt und durch die Untersuchung des Einflusses des Nutzungsmodus auf die Technikakzeptanz.

Zuerst wurde Technikakzeptanz als positive Einstellung gegenüber einem bestimmten technischen Produkt in Kombination mit der Absicht, das technische Produkt zu verwenden, neu definiert. Dann wurden verschiedene Modelle für Technikakzeptanz in Betracht gezogen und hinsichtlich ihrer Eignung für die Erklärung der Technikakzeptanz von hedonistischen und dualen technischen Produkten beurteilt. Das revised TAM wurde ausgewählt, da es bereits bei Untersuchungen hedonistischer Systeme zum Einsatz kam und sich als besser als bestehende Modelle erwies, die hedonistische Aspekte nicht berücksichtigen. Auf Grund der noch immer geringen Erklärungsvarianz wurde nach Verbesserungsmöglichkeiten für das Modell gesucht. Als Grundlage für die Verbesserung wurden Bedürfnisse als Auslöser für positive Emotionen während der Interaktion mit Produkten gefunden. Stimulation, Kompetenz und Identifikation wurden als vielversprechendste Bedürfnisse identifiziert. Diese Bedürfnisse waren bereits Teil des hedonischen / pragmatisches Modell der User Experience. Dies führte zu der Entscheidung, beide Modelle in einem Modell zu vereinen. Das resultierende Modell wurde Balanced TAM genannt.

Drei Benutzerstudien wurden durchgeführt, um die Gültigkeit und Aussagekraft des Modells zu testen. Es konnte gezeigt werden, dass Balanced TAM deutlich mehr Varianz der Technikakzeptanz als revised TAM bei hedonistischen und dualen Produkten erklärt. Darüber hinaus war es gleich gut bei der Verwendung bei utilitaristischen Produkten. Die Ergebnisse und das methodische Vorgehen wurden diskutiert und offene Punkte identifiziert. Diese Punkte wurden in dem Abschnitt Ausblick am Ende der Arbeit aufgegriffen.

8 Literature

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9 Appendix

A. : Complete questionnaires of Study 1: Nintendo Wii Motion Plus™

Akzeptanz des Systems

Sehr geehrte Versuchsteilnehmer,

vielen Dank, dass Sie an meiner Untersuchung teilnehmen.

Der folgende Fragebogen beschäftigt sich mit Ihrer Akzeptanz der Nintendo Wii Motion Plus. Dabei interessiert uns besonders deren Veränderungen mit der Zeit. Deshalb ist es wichtig, dass sie alle Fragen immer passend für den aktuellen Moment beantworten. Einige Fragen betreffen außerdem auch Ihren generellen Umgang mit technischen Produkten. Wie alle persönlichen Angaben in dieser Untersuchung sind Ihre Antworten auf diese Fragen geheim und werden nur anonym zu statistischen Zwecken ausgewertet.

Aus diesem Grund bitte ich Sie an keiner Stelle Ihren Namen anzugeben, sondern einen persönlichen Identifikationscode zu nutzen, der sich aus dem ersten Buchstaben des Vornamens Ihrer Mutter, dem ersten Buchstaben des Vornamens Ihres Vaters und den letzten beiden Stellen Ihres Geburtsjahres ergibt.

Beispiel:
Ihre Mutter heißt Inge (**I**), Ihr Vater Klaus (**K**) und Sie sind 1975 geboren (**75**)
→ Ihr Code wäre dann **IK75**

Bitte tragen Sie hier Ihren Code ein | | | | |

Falls Sie während des Experiments Fragen haben sollten, wenden Sie sich gerne jederzeit an mich.
Da manche persönliche Informationen, wie z.B. Ihre Ausbildung oder Erfahrungen, für die Interpretation wichtig sind, bitte ich Sie nun, mir nun einige Angaben zu Ihrer Person zu machen.

Alter: _____

Geschlecht: ☐männlich ☐weiblich

Höchster Schulabschluss:

Hauptschulabschluss	☐
Mittlere Reife	☐
Abitur	☐
Hochschulabschluss	☐
andere	☐ → Welchen?

Aktueller Beruf / Studienfach:

_____

Student / -in ☐ja ☐nein

Gibt es in Ihrem Haushalt eine Nintendo Wii Konsole? ☐ Ja ☐ Nein

Gibt es in Ihrem Haushalt eine Nintendo Wii Motion Plus? ☐ Ja ☐ Nein

Falls ja,

wie lange schon? _____ Monate

Wie viele Stunden in der Woche nutzen Sie sie? _____ Stunden

Wie lang ist die letzte Benutzung her? _____ Tage/ Wochen/ Monate

Wenn Sie einmal am Spielen sind, wie lange am Stück spielen Sie durchschnittlich?

_____ Stunden

Nutzen Sie die Konsole hauptsächlich alleine ☐ oder mit anderen ☐ ?

Welche Art von Spielen nutzen Sie am liebsten?

- ☐ Action
- ☐ Adventure
- ☐ Rollenspiel
- ☐ Gesellschaftsspiele
- ☐ Jump & Run
- ☐ Simulationen
- ☐ Sportspiele
- ☐ Strategie
- ☐ Andere _____

Wie sieht es mit **realen** Sportarten aus? Welche Erfahrung haben Sie mit…

	keine Erfahrung						Experte
Golf	☐	☐	☐	☐	☐	☐	☐
Schwertkampf	☐	☐	☐	☐	☐	☐	☐
Jetboot	☐	☐	☐	☐	☐	☐	☐
Kanufahren	☐	☐	☐	☐	☐	☐	☐
Bogenschießen	☐	☐	☐	☐	☐	☐	☐
Bowling	☐	☐	☐	☐	☐	☐	☐
Basketball	☐	☐	☐	☐	☐	☐	☐
Fallschirmspringen	☐	☐	☐	☐	☐	☐	☐
Tischtennis	☐	☐	☐	☐	☐	☐	☐
Frisbee	☐	☐	☐	☐	☐	☐	☐
Wakeboard	☐	☐	☐	☐	☐	☐	☐
Radfahren	☐	☐	☐	☐	☐	☐	☐

Für die nun folgenden Fragen steht Ihnen eine Antwortskala mit 7 Stufen zur Verfügung. Die Skala reicht entweder von „Stimmt gar nicht“ bis „Stimmt absolut“ oder von „stimme gar nicht zu“ bis „stimme vollkommen zu“. Das Beispiel erklärt das Prinzip noch einmal.

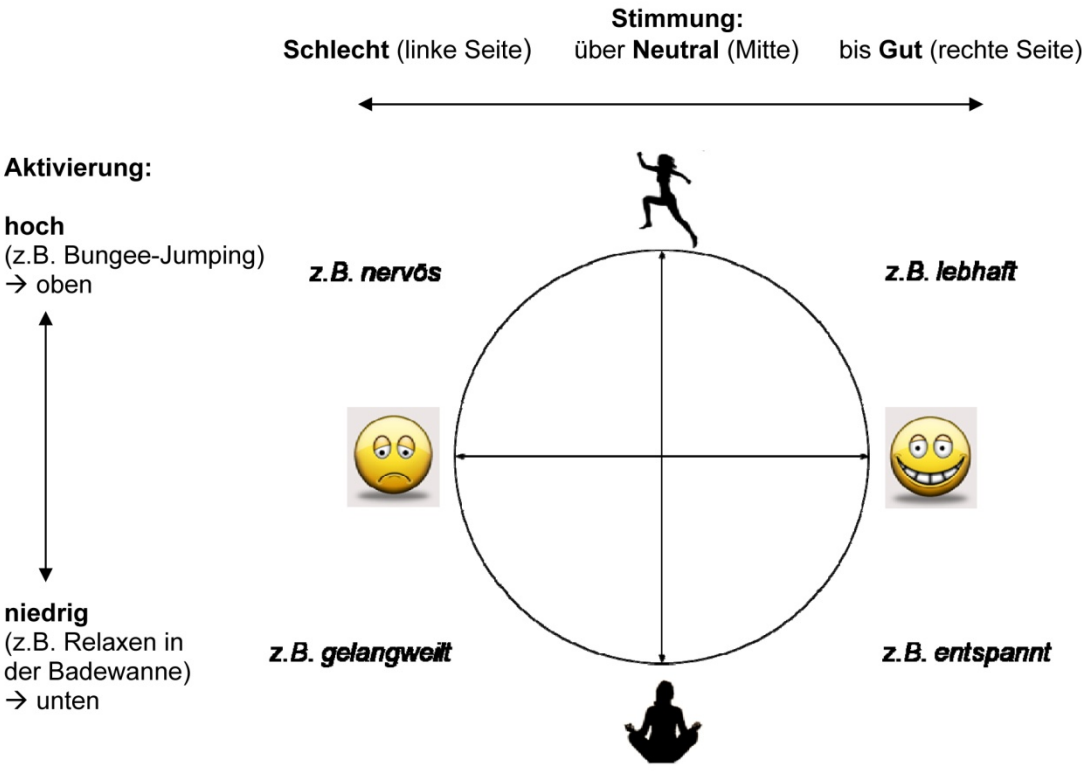
Beispiel:

	stimme gar nicht zu						stimme vollkommen zu
Ich habe vor ein solches System zu nutzen.	☐	☐	☐	☐	☐	☒	☐

Mit dieser Antwort würden Sie sagen, dass sie der Aussagen dieses System nutzen zu wollen stark zustimmen.

	stimme gar nicht zu						stimme vollkommen zu
Beim Kauf von Spielekonsolen und Zubehör wähle ich Produkte von Nintendo.	☐	☐	☐	☐	☐	☐	☐
Ich finde, die Marke Nintendo passt zu mir.	☐	☐	☐	☐	☐	☐	☐
Ich habe in allem meinen persönlichen Stil.	☐	☐	☐	☐	☐	☐	☐
Ich kaufe absichtlich nichts, was gerade „in“ ist.	☐	☐	☐	☐	☐	☐	☐
Dingen, die mir wichtig sind, sieht man an, dass sie mir gehören.	☐	☐	☐	☐	☐	☐	☐
Es ist mir wichtig, einzigartig zu sein.	☐	☐	☐	☐	☐	☐	☐

Bevor es nun mit den Fragen losgeht, bitte ich Sie, mir an dieser Stelle Auskunft über Ihre aktuelle Stimmung zu geben. Setzen Sie dazu ein Kreuzchen an die passende Stelle im untenstehenden Diagramm. Es zeigt alle möglichen Kombinationen von Stimmung und Aktivierung. Wenn Sie z. B. sehr aktiviert und in guter Stimmung wären, würde man Ihre momentane Stimmung als lebhaft beschreiben. Natürlich sind hier alle Zwischenstufen möglich, setzen Sie Ihr Kreuz bitte an die Stelle, die Ihre momentane Stimmung am besten beschreibt.



Falls Sie hierzu noch Fragen haben, wenden Sie sich bitte an mich!

Der folgende Fragebogen beschäftigt sich mit Ihrer Meinung zu Problemen im Umgang mit technischen Geräten. Dazu haben wir 8 Aussagen formuliert, die sie bejahen oder verneinen können, je nach Ihrer persönlichen Ansicht. Kreuzen Sie bitte das entsprechende Feld an, wichtig ist:

Hier gibt es keine richtigen oder falschen Antworten, allein Ihre persönliche Meinung zählt!

Mit „technischen Problemen“ sind hier Schwierigkeiten im Umgang mit den verschiedensten Geräten aus Alltag und Beruf gemeint, z.B. bei der:

- Programmierung des Videorekorders
- Arbeit mit dem Computer
- Bedienung einer Mikrowelle
- Aufstellung von Selbstmontagemöbeln
- Bedienung von Wasserhähnen in öffentliche Toiletten
- Lösung von Fahrkarten an Automaten

		Stimmt gar nicht	Stimmt meistens nicht	Stimmt eher nicht	Stimmt eher	Stimmt meistens	Stimmt absolut
1	Ich kann ziemlich viele der technischen Probleme, mit denen ich konfrontiert bin, allein lösen.	o	o	o	o	o	o
2	Technische Geräte sind oft undurchschaubar und schwer zu beherrschen.	o	o	o	o	o	o
3	Es macht mir richtig Spaß, ein technisches Problem zu knacken.	o	o	o	o	o	o
4	Weil ich mit bisherigen technischen Problemen gut zurecht gekommen bin, blicke ich auch künftigen optimistisch entgegen.	o	o	o	o	o	o
5	Ich fühle mich technischen Geräten gegenüber so hilflos, dass ich lieber die Finger von ihnen lasse.	o	o	o	o	o	o
6	Auch wenn Widerstände auftreten, bearbeite ich ein technisches Problem weiter.	o	o	o	o	o	o
7	Wenn ich ein technisches Problem löse, so geschieht dies meistens durch Glück.	o	o	o	o	o	o
8	Die meisten technischen Probleme sind so kompliziert, dass es wenig Sinn hat, sich mit ihnen auseinanderzusetzen.	o	o	o	o	o	o

Auf den folgenden zwei Seiten geht es um Ihren generellen Umgang mit technischen Produkten. Bitte denken Sie auch hier nicht lange über Ihre Antworten nach, sondern beantworten Sie die Fragen so spontan wie möglich.

	stimme gar nicht zu						stimme vollkommen zu
Wenn es um technische Produkte geht, denke ich über die Kaufentscheidung intensiv nach.	☐	☐	☐	☐	☐	☐	☐
Zu wissen, wie etwas bei technischen Produkten funktioniert oder abläuft, genügt mir nicht, ich will auch die Wirkungsweisen oder Funktionszusammenhänge kennen.	☐	☐	☐	☐	☐	☐	☐
Ich überlege mir gern bzw. oft, wie ich technische Produkte anders oder besser als bisher verwenden kann.	☐	☐	☐	☐	☐	☐	☐
Es macht mir Spaß, mich mit Informationen über technische Produkte zu beschäftigen.	☐	☐	☐	☐	☐	☐	☐
Wenn es um technische Produkte geht, hinterfrage ich oft Informationen, die ich über diese Produkte oder diese Branche erhalte.	☐	☐	☐	☐	☐	☐	☐
Wenn ich mit der Verwendung meiner technischen Produkte nicht zufrieden bin, suche ich nach Erklärungen, Zusammenhängen oder Ursachen.	☐	☐	☐	☐	☐	☐	☐
Ich finde es spannend, bei technischen Produkten neue „Gebrauchs- oder Verwendungsphilosophien“ zu lernen.	☐	☐	☐	☐	☐	☐	☐
Ich finde es anregend und unterhaltsam, mich mit Informationen über technische Produkte auseinanderzusetzen.	☐	☐	☐	☐	☐	☐	☐
Wenn es um technische Produkte geht, neige ich dazu, Sachverhalte und Informationen über Produkte oder die Branche erst einmal zu analysieren.	☐	☐	☐	☐	☐	☐	☐
Wenn es um technische Produkte geht, genügt es mir zu wissen, dass das Produkt funktioniert, über alles andere bei dem Produkt denke ich dann nicht nach.	☐	☐	☐	☐	☐	☐	☐
Wenn es um technische Produkte geht, stelle ich gern mal ungewohnte Gedankengänge und Überlegungen an, wie ich das Produkt anders als bisher verwenden/einsetzen könnte.	☐	☐	☐	☐	☐	☐	☐
Informationen über technische Produkte kann ich stundenlang studieren, ohne dass es mich nervt oder mir langweilig wird.	☐	☐	☐	☐	☐	☐	☐

	stimme gar nicht zu						stimme vollkommen zu
Ich würde komplexe Probleme einfachen Problemen vorziehen.	☐	☐	☐	☐	☐	☐	☐
Ich mag es, die Verantwortung in Situationen zu tragen, die viel Denken erfordern.	☐	☐	☐	☐	☐	☐	☐
Nachdenken ist nicht mein Verständnis von Spaß.	☐	☐	☐	☐	☐	☐	☐
Ich würde lieber etwas machen, das wenig Nachdenken erfordert als etwas, das meine Denkfähigkeiten herausfordert.	☐	☐	☐	☐	☐	☐	☐
Ich versuche Situationen vorherzusehen und zu vermeiden, die höchstwahrscheinlich von mir verlangen in Tiefe über ein etwas nachzudenken.	☐	☐	☐	☐	☐	☐	☐
Ich finde es befriedigend gründlich und stundenlang nach zu denken.	☐	☐	☐	☐	☐	☐	☐
Ich denke nur so gründlich nach wie es sein muss.	☐	☐	☐	☐	☐	☐	☐
Ich bevorzuge es über kleine, tägliche Projekte nachzudenken an Stelle von längerfristigen Projekten.	☐	☐	☐	☐	☐	☐	☐
Ich bevorzuge Aufgaben die, sobald man sie erlernt hat, wenig nachdenken erfordern.	☐	☐	☐	☐	☐	☐	☐
Die Idee, mich auf meine geistigen Fähigkeiten zu verlassen, um meinen Weg nach oben zu machen, gefällt mir-	☐	☐	☐	☐	☐	☐	☐
Ich genieße Aufgaben, die es beinhalten neue Ideen zu entwickeln.	☐	☐	☐	☐	☐	☐	☐
Zu lernen auf neue Arten zu denken, finde ich nicht sehr aufregend.	☐	☐	☐	☐	☐	☐	☐
Ich bevorzuge es, mein Leben voller Puzzle zu haben, die ich lösen muss.	☐	☐	☐	☐	☐	☐	☐
Die Idee abstrakt zu denken gefällt mir.	☐	☐	☐	☐	☐	☐	☐
Ich würde eine Aufgabe die intellektuell, schwierig und wichtig ist einer Aufgabe vorziehen, die zwar ebenfalls wichtig ist, aber wenig Nachdenken erfordert.	☐	☐	☐	☐	☐	☐	☐
Ich fühle eher Erleichterung als Zufriedenheit, wenn ich eine Aufgabe gelöst habe die sehr viel geistige Anstrengung von mir gefordert hat.	☐	☐	☐	☐	☐	☐	☐
Es reicht mir wenn Aufgaben erledigt werden, ich interessiere mich nicht dafür wie oder warum es funktioniert.	☐	☐	☐	☐	☐	☐	☐
Oftmals finde ich mich über Dinge nachdenkend, auch wenn sie mich nicht persönlich betreffen.	☐	☐	☐	☐	☐	☐	☐

Bitte geben Sie mir an dieser Stelle Bescheid!

Nachdem Sie nun einen ersten Eindruck von dem Produkt erhalten haben, um das es sich in meiner Studie handelt, würde ich Sie bitten sich die Benutzung der Nintendo Wii Motion Plus vorzustellen und den folgenden Fragebogen danach auszufüllen.
Einige Fragen mögen Ihnen dabei seltsam vorkommen. Bitte versuchen Sie so spontan wie möglich zu antworten.
Zur Erinnerung: Es gibt weder Richtig noch Falsch.

Wie schätzen Sie die Benutzung ein?

	stimme gar nicht zu						stimme vollkommen zu
Ich habe vor ein solches System zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Das System ist leicht zu kontrollieren.	☐	☐	☐	☐	☐	☐	☐
Obwohl ich das System gut beherrsche, wünsche ich mir eine noch direktere Kontrolle.	☐	☐	☐	☐	☐	☐	☐
Ich finde das System umständlich zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Ich werde anderen die Nutzung eines solchen Systems empfehlen.	☐	☐	☐	☐	☐	☐	☐
Durch die Nutzung dieses Systems kann ich deutlich zeigen, dass ich jemand besonderes bin.	☐	☐	☐	☐	☐	☐	☐
Ich fühle mich mit anderen Systemnutzern zusammengehörig.	☐	☐	☐	☐	☐	☐	☐
Die Bedienung des Systems fällt mir leicht zu lernen.	☐	☐	☐	☐	☐	☐	☐
Es war immer klar, ob das System oder ich eine Entscheidung treffen mussten.	☐	☐	☐	☐	☐	☐	☐
Ich glaube, die Nutzung eines solchen Systems ist insgesamt teuer.	☐	☐	☐	☐	☐	☐	☐
Dieses System ist vollkommen neuartig für mich.	☐	☐	☐	☐	☐	☐	☐
Ich finde das System insgesamt gut.	☐	☐	☐	☐	☐	☐	☐
Insgesamt finde ich das System einfach zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Ich habe eine positive Wahrnehmung von der Nutzung eines solchen Systems.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems unterhaltsam.	☐	☐	☐	☐	☐	☐	☐
Es macht mir Spaß, das System direkt zu beherrschen.	☐	☐	☐	☐	☐	☐	☐
Ich finde, die Nutzung eines solchen Systems bringt mir Vorteile.	☐	☐	☐	☐	☐	☐	☐
Ein solches System gewinnt deutlich an Wert, wenn ich jemandem davon erzählen kann.	☐	☐	☐	☐	☐	☐	☐
Ich weiß zu jedem Zeitpunkt, was das System auf meine Befehle hin tun wird.	☐	☐	☐	☐	☐	☐	☐
Ich verstehe die Logik in der Benutzung des Systems.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems spaßig.	☐	☐	☐	☐	☐	☐	☐
Die Anwesenheit anderer ist für ein gutes Ergebnis im Umgang mit dem System eher hinderlich.	☐	☐	☐	☐	☐	☐	☐
Es ist anzunehmen, dass Menschen wie ich solch ein System nutzen werden.	☐	☐	☐	☐	☐	☐	☐
Alles in allem ist es ein ziemlich überflüssiges System.	☐	☐	☐	☐	☐	☐	☐

	stimme gar nicht zu						stimme vollkommen zu
Ich fühle mich anderen überlegen, weil ich in der Lage bin das System zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Die Anwesenheit anderer hat zu einer neuen Sichtweise auf das System geführt.	☐	☐	☐	☐	☐	☐	☐
Ich sehe mich als einen Menschen, der so ein System benutzen würde.	☐	☐	☐	☐	☐	☐	☐
Es fällt mir leicht, mir zu merken wie ich bestimmte Aufgaben mit dem System erledige.	☐	☐	☐	☐	☐	☐	☐
Es weckt Freude in mir, wenn ich an die eigenhändige Bedienung des Systems denke.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems aufregend.	☐	☐	☐	☐	☐	☐	☐
Ich finde, das System stellt eine sehr nützliche Hilfestellung dar.	☐	☐	☐	☐	☐	☐	☐
Ich würde meine Systemnutzung lieber vor anderen verheimlichen.	☐	☐	☐	☐	☐	☐	☐
Das System und ich haben nicht gut zusammengearbeitet.	☐	☐	☐	☐	☐	☐	☐
Menschen die ich bewundere, erwarten von mir ein solches System zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Meine Freunde wären von dem System sicher sehr begeistert.	☐	☐	☐	☐	☐	☐	☐
Ich fühle mich durch das System bevormundet.	☐	☐	☐	☐	☐	☐	☐
Das System erleichtert mir das Erreichen meiner Ziele.	☐	☐	☐	☐	☐	☐	☐
Die Funktionsweise des Systems zu verstehen fordert mich heraus.	☐	☐	☐	☐	☐	☐	☐
Dieses System entspricht meinen Wert-vorstellungen.	☐	☐	☐	☐	☐	☐	☐
Das System weckt positive Erinnerungen in mir.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems verlangt eine hohe geistige Anstrengung.	☐	☐	☐	☐	☐	☐	☐
Ich sehe das System nicht als gleichwertigen Partner in der Interaktion.	☐	☐	☐	☐	☐	☐	☐
Ich finde, ein solches System ist generell nützlich für mein Leben.	☐	☐	☐	☐	☐	☐	☐
Ich bevorzuge es, das System alleine zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Meine Interaktion mit dem System ist klar und verständlich.	☐	☐	☐	☐	☐	☐	☐
Das Erlernen der Bedienung des Systems ist eine Herausforderung für mich.	☐	☐	☐	☐	☐	☐	☐
Ich finde, es kostet viel Anstrengung gut im Umgang mit dem System zu werden.	☐	☐	☐	☐	☐	☐	☐

	stimme gar nicht zu						stimme vollkommen zu
Mir wichtige Personen denken, ich sollte ein solches System nutzen.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems macht mich effektiver.	☐	☐	☐	☐	☐	☐	☐
Ich habe vor ein solches System so viel wie möglich zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Ich würde das System gerne zukünftig nutzen.	☐	☐	☐	☐	☐	☐	☐
Ich glaube, der Preis eines solchen Systems stellt für mich ein Hindernis dar.	☐	☐	☐	☐	☐	☐	☐
Die Nutzung des Systems stellt keine Herausforderung für mich dar.	☐	☐	☐	☐	☐	☐	☐
Das System entwickelt seine Funktionalität erst vollständig wenn mehrere Personen es benutzen.	☐	☐	☐	☐	☐	☐	☐
Die Aufgabenteilung zwischen dem System und mir ist partnerschaftlich.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems fesselt mich.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung eines solchen Systems ist gesellschaftlich angesehen.	☐	☐	☐	☐	☐	☐	☐
Die Interaktion mit dem System erlaubt mir den Ausgang der Handlungen gut zu beeinflussen.	☐	☐	☐	☐	☐	☐	☐
Das System verliert etwas von seinem „Zauber“ wenn man anderen davon berichtet.	☐	☐	☐	☐	☐	☐	☐
Sobald ein solches System käuflich ist, habe ich vor ein ähnliches System für mich zu erwerben.	☐	☐	☐	☐	☐	☐	☐
Ich finde es leicht, das System dazu zu bringen, zu machen was ich möchte.	☐	☐	☐	☐	☐	☐	☐
Während der Benutzung hatte ich das Gefühl, dass das System gut auf meine Befehle reagiert.	☐	☐	☐	☐	☐	☐	☐
Die Zeit ist während der Systemnutzung wie im Flug vergangen.	☐	☐	☐	☐	☐	☐	☐
Durch die Benutzung des Systems habe ich wichtige Fähigkeiten erlernt.	☐	☐	☐	☐	☐	☐	☐
Ich bin vertraut mit dem System.	☐	☐	☐	☐	☐	☐	☐
Bei der Benutzung des Systems fühle ich mich kompetent.	☐	☐	☐	☐	☐	☐	☐
Während der Systembenutzung habe ich alles um mich herum vergessen.	☐	☐	☐	☐	☐	☐	☐
Das System ist erfrischend anders als mir bekannte Systeme.	☐	☐	☐	☐	☐	☐	☐
Insgesamt würde ich das System akzeptieren.	☐	☐	☐	☐	☐	☐	☐
Angenommen, das System stünde mir zur Verfügung, gehe ich davon aus, dass ich das System zukünftig regelmäßig nutzen würde.	☐	☐	☐	☐	☐	☐	☐
Das System ist optisch attraktiv.	☐	☐	☐	☐	☐	☐	☐

Welche der folgenden Aussagen passt am besten zu Ihnen?

(1) Ich treffe die Entscheidung die Nintendo Wii zu benutzen auf Basis meiner Intuition und Erfahrungen. Nach meiner Vorstellung ist die Wii ein nützliches und spannendes Instrument. Ich habe mich dafür schon Interessiert und versucht herauszufinden, was sie alles kann. Ich wünschte mir die neueste Version zu besitzen, sobald sie auf den Markt kommt.
(2) Ich würde mir anschauen, wie andere die Wii benutzen und mich versichern, dass sie keine Fehler in den Funktionen hat. Zusätzlich überlege ich, ob Nutzen und Spaß im richtigen Verhältnis zum Preis stehen. Wenn ich denke, die Nintendo Wii würde sich lohnen, würde ich die Entscheidung treffen sie zu kaufen.
(3) Ich werde mich nicht mit der Nintento Wii und ihren Funktionen beschäftigen, auch wenn sie sehr beliebt und modern ist. Wenn sie allerdings weitere nützliche Möglichkeiten bietet (z.B. integrierter DVD-Player), dann werde ich darüber nachdenken.

Aussage: ☐ 1 ☐ 2 ☐ 3

	stimme ganz und gar nicht zu		*neutral*		stimme ganz entschieden zu
Ich denke, ich würde die Nintendo Wii gerne häufiger benutzen.	☐	☐	☐	☐	☐
Ich finde die Wii unnötig komplex.	☐	☐	☐	☐	☐
Ich finde, die Wii ist einfach zu benutzen.	☐	☐	☐	☐	☐
Ich denke, ich würde die Unterstützung einer erfahreneren Person brauchen, um in der Lage zu sein, die Wii zu benutzen.	☐	☐	☐	☐	☐
Ich finde, die verschiedenen Funktionen in dieser Konsole sind gut integriert.	☐	☐	☐	☐	☐
Ich denke, es gibt zu viele Inkonsistenzen in diesem System.	☐	☐	☐	☐	☐
Ich könnte mir vorstellen, dass die meisten Leute sehr schnell lernen würden mit dieser Konsole umzugehen.	☐	☐	☐	☐	☐
Ich fand das System sehr schwerfällig im Gebrauch.	☐	☐	☐	☐	☐
Ich fühlte mich sehr sicher bei der Benutzung der Wii.	☐	☐	☐	☐	☐
Ich musste eine Menge lernen, bevor ich mit dieser Konsole zurechtkam.	☐	☐	☐	☐	☐

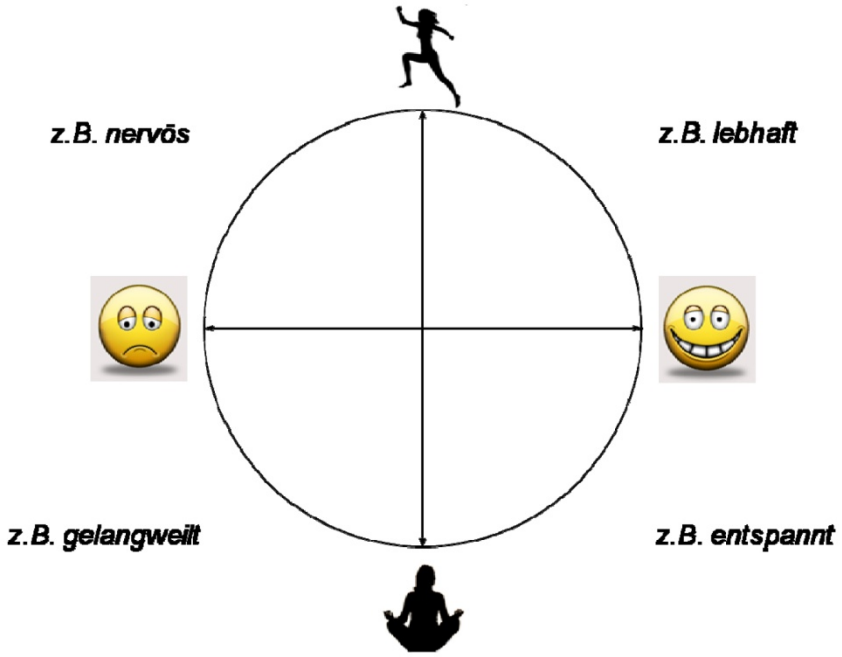
Ihr Urteil !

Bitte geben Sie mit Hilfe der folgenden Wortpaare Ihren Eindruck der Nintendo Wii wieder. Wichtig ist dabei, dass Sie die Konsole und nicht das Spiel beurteilen.
Bitte kreuzen Sie nur jeweils ein Kästchen an!

Bitte ausfüllen...

	1	2	3	4	5	6	7	
menschlich	☐	☐	☐	☐	☐	☐	☐	technisch
isolierend	☐	☐	☐	☐	☐	☐	☐	verbindend
angenehm	☐	☐	☐	☐	☐	☐	☐	unangenehm
originell	☐	☐	☐	☐	☐	☐	☐	konventionell
einfach	☐	☐	☐	☐	☐	☐	☐	kompliziert
fachmännisch	☐	☐	☐	☐	☐	☐	☐	laienhaft
hässlich	☐	☐	☐	☐	☐	☐	☐	schön
praktisch	☐	☐	☐	☐	☐	☐	☐	unpraktisch
sympathisch	☐	☐	☐	☐	☐	☐	☐	unsympathisch
umständlich	☐	☐	☐	☐	☐	☐	☐	direkt
stilvoll	☐	☐	☐	☐	☐	☐	☐	stillos
voraussagbar	☐	☐	☐	☐	☐	☐	☐	unberechenbar
minderwertig	☐	☐	☐	☐	☐	☐	☐	wertvoll
ausgrenzend	☐	☐	☐	☐	☐	☐	☐	einbeziehend
bringt mich den Leuten näher	☐	☐	☐	☐	☐	☐	☐	trennt mich von Leuten
nicht vorzeigbar	☐	☐	☐	☐	☐	☐	☐	vorzeigbar
zurückweisend	☐	☐	☐	☐	☐	☐	☐	einladend
phantasielos	☐	☐	☐	☐	☐	☐	☐	kreativ
gut	☐	☐	☐	☐	☐	☐	☐	schlecht
verwirrend	☐	☐	☐	☐	☐	☐	☐	übersichtlich
abstoßend	☐	☐	☐	☐	☐	☐	☐	anziehend
mutig	☐	☐	☐	☐	☐	☐	☐	vorsichtig
innovativ	☐	☐	☐	☐	☐	☐	☐	konservativ
lahm	☐	☐	☐	☐	☐	☐	☐	fesselnd
harmlos	☐	☐	☐	☐	☐	☐	☐	herausfordernd
motivierend	☐	☐	☐	☐	☐	☐	☐	entmutigend
neuartig	☐	☐	☐	☐	☐	☐	☐	herkömmlich
widerspenstig	☐	☐	☐	☐	☐	☐	☐	handhabbar

An dieser Stelle bitte ich Sie, noch einmal Ihre aktuelle Stimmung möglichst genau im untenstehenden Modell einzutragen.

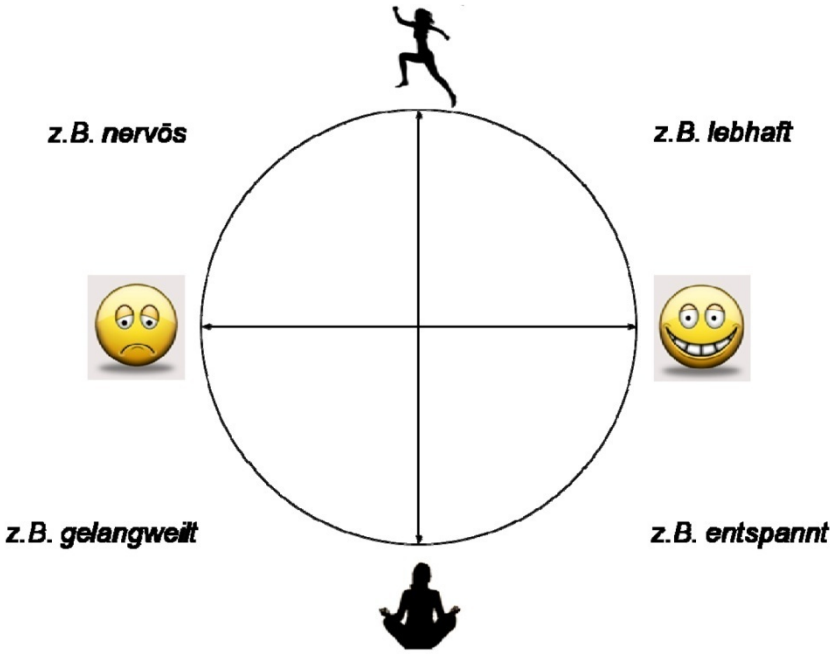


Nun geben Sie mir bitte Bescheid, damit der praktische Teil beginnen kann!
Danke!

O

Tragen Sie hier bitte wieder Ihren persönlichen Identifikationscode ein. Zur Erinnerung, er setzt sich zusammen aus dem ersten Buchstaben des Vornamens Ihrer Mutter, dem ersten Buchstaben des Vornamens Ihres Vaters und den letzten beiden Stellen Ihres Geburtsjahres.

An dieser Stelle würde ich Sie nun bitten, mir erneut Auskunft über Ihre aktuelle Stimmung zu geben. Setzen Sie dazu bitte wieder ein Kreuzchen an die passende Stelle im untenstehenden Diagramm.



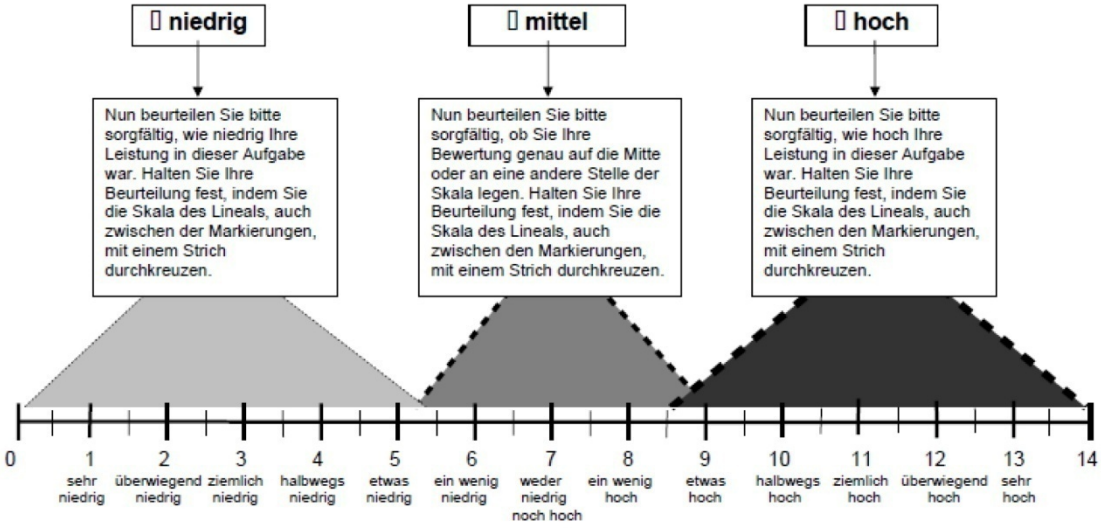
P

Beurteilung der bei der Aufgabe erzielten Leistung

Mit der folgenden Skala sollen Sie die Leistung bewerten, die Sie bei der soeben durchgeführten Aufgabe erzielt haben. Wie gut ist es Ihnen, Ihrer Ansicht nach, gelungen, die vom Versuchsleiter gesetzten Aufgabenziele zu erreichen?

In welchem Ausmaß waren Sie bei der Verfolgung dieser Ziele mit Ihrer Leistung zufrieden?

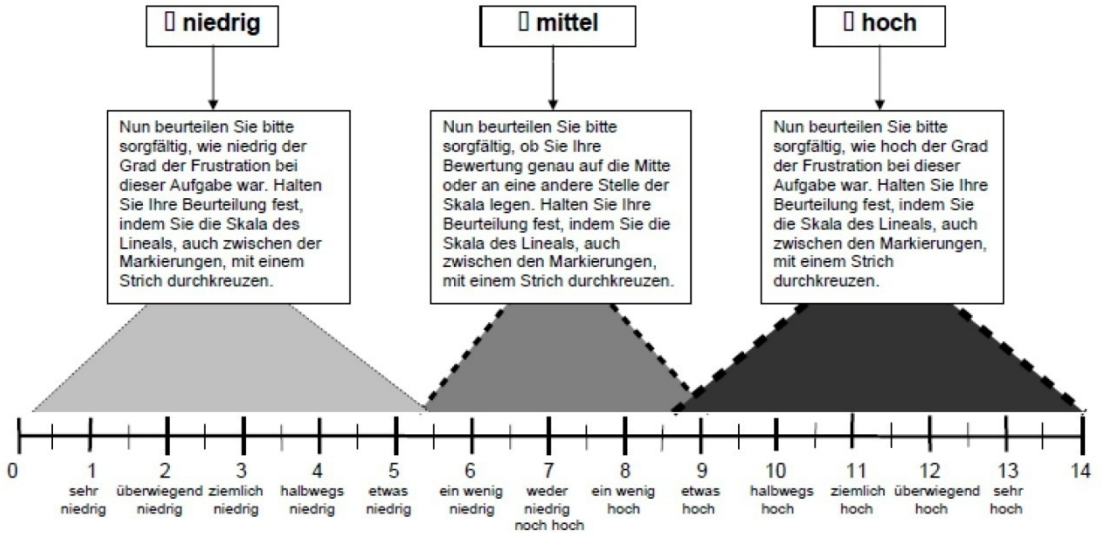
Beurteilen Sie zunächst grob, ob Ihre Leistung bei der Aufgabe niedrig, mittel oder hoch war. Machen Sie bitte ein Kreuz im entsprechenden Kästchen. Folgen Sie dann bitte dem nach unten weisenden Pfeil.



Beurteilung der bei der Aufgabe empfundene Frustration

Mit der folgenden Skala sollen Sie beurteilen, wie hoch der Grad der Frustration war, den Sie bei der soeben durchgeführten Aufgabe empfunden haben. Wie verunsichert, entmutigt, irritiert, gestresst und verärgert bzw. selbstsicher, befriedigt, zufrieden, entspannt und selbstzufrieden fühlten Sie sich während der Aufgabe?

Beurteilen Sie zunächst grob, ob der bei der Aufgabe empfundene Grad der Frustration niedrig, mittel oder hoch war. Machen Sie bitte ein Kreuz im entsprechenden Kästchen. Folgen Sie dann bitte dem nach unten weisenden Pfeil.

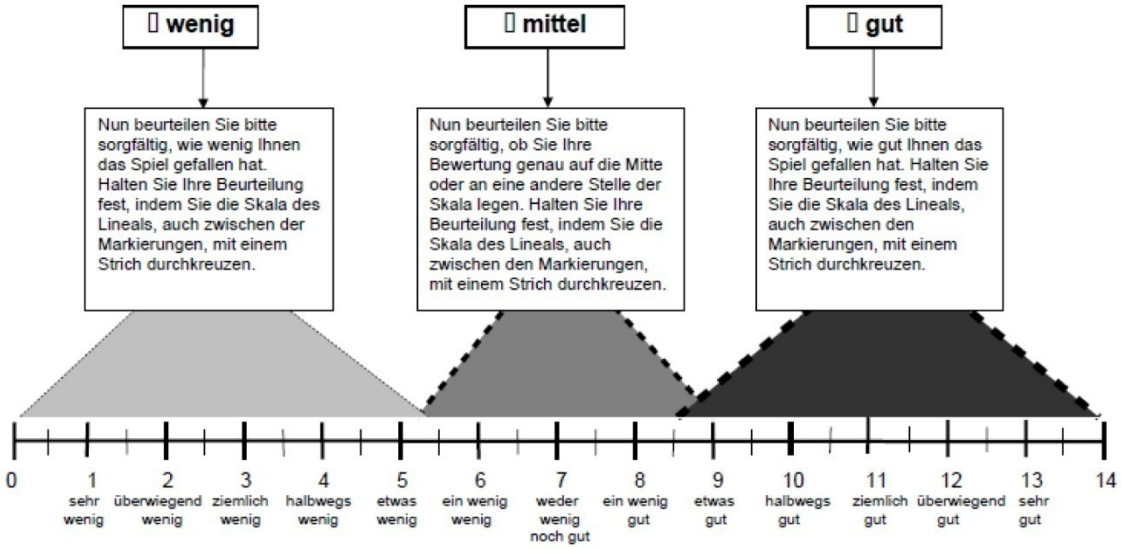


Q

Beurteilung des Gefallens des Spieles

Mit der folgenden Skala sollen Sie beurteilen, wie gut Ihnen das Spiel gefallen hat.

Beurteilen Sie zunächst grob, ob Ihnen das Spiel wenig, mittel oder gut gefallen hat. Machen Sie bitte ein Kreuz im entsprechenden Kästchen. Folgen Sie dann bitte dem nach unten weisenden Pfeil.



R

	stimme gar nicht zu						stimme vollkommen zu
Ich habe vor ein solches System zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Das System ist leicht zu kontrollieren.	☐	☐	☐	☐	☐	☐	☐
Obwohl ich das System gut beherrsche, wünsche ich mir eine noch direktere Kontrolle.	☐	☐	☐	☐	☐	☐	☐
Ich finde das System umständlich zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Ich werde anderen die Nutzung eines solchen Systems empfehlen.	☐	☐	☐	☐	☐	☐	☐
Durch die Nutzung dieses Systems kann ich deutlich zeigen, dass ich jemand besonderes bin.	☐	☐	☐	☐	☐	☐	☐
Ich fühle mich mit anderen Systemnutzern zusammengehörig.	☐	☐	☐	☐	☐	☐	☐
Die Bedienung des Systems fällt mir leicht zu lernen.	☐	☐	☐	☐	☐	☐	☐
Es war immer klar, ob das System oder ich eine Entscheidung treffen mussten.	☐	☐	☐	☐	☐	☐	☐
Ich glaube, die Nutzung eines solchen Systems ist insgesamt teuer.	☐	☐	☐	☐	☐	☐	☐
Dieses System ist vollkommen neuartig für mich.	☐	☐	☐	☐	☐	☐	☐
Ich finde das System insgesamt gut.	☐	☐	☐	☐	☐	☐	☐
Insgesamt finde ich das System einfach zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Ich habe eine positive Wahrnehmung von der Nutzung eines solchen Systems.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems unterhaltsam.	☐	☐	☐	☐	☐	☐	☐
Es macht mir Spaß, das System direkt zu beherrschen.	☐	☐	☐	☐	☐	☐	☐
Ich finde, die Nutzung eines solchen Systems bringt mir Vorteile.	☐	☐	☐	☐	☐	☐	☐
Ein solches System gewinnt deutlich an Wert, wenn ich jemandem davon erzählen kann.	☐	☐	☐	☐	☐	☐	☐
Ich weiß zu jedem Zeitpunkt, was das System auf meine Befehle hin tun wird.	☐	☐	☐	☐	☐	☐	☐
Ich verstehe die Logik in der Benutzung des Systems.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems spaßig.	☐	☐	☐	☐	☐	☐	☐
Die Anwesenheit anderer ist für ein gutes Ergebnis im Umgang mit dem System eher hinderlich.	☐	☐	☐	☐	☐	☐	☐
Es ist anzunehmen, dass Menschen wie ich solch ein System nutzen werden.	☐	☐	☐	☐	☐	☐	☐
Alles in allem ist es ein ziemlich überflüssiges System.	☐	☐	☐	☐	☐	☐	☐

	stimme gar nicht zu						stimme vollkommen zu
Ich fühle mich anderen überlegen, weil ich in der Lage bin das System zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Die Anwesenheit anderer hat zu einer neuen Sichtweise auf das System geführt.	☐	☐	☐	☐	☐	☐	☐
Ich sehe mich als einen Menschen, der so ein System benutzen würde.	☐	☐	☐	☐	☐	☐	☐
Es fällt mir leicht, mir zu merken wie ich bestimmte Aufgaben mit dem System erledige.	☐	☐	☐	☐	☐	☐	☐
Es weckt Freude in mir, wenn ich an die eigenhändige Bedienung des Systems denke.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems aufregend.	☐	☐	☐	☐	☐	☐	☐
Ich finde, das System stellt eine sehr nützliche Hilfestellung dar.	☐	☐	☐	☐	☐	☐	☐
Ich würde meine Systemnutzung lieber vor anderen verheimlichen.	☐	☐	☐	☐	☐	☐	☐
Das System und ich haben nicht gut zusammengearbeitet.	☐	☐	☐	☐	☐	☐	☐
Menschen die ich bewundere, erwarten von mir ein solches System zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Meine Freunde wären von dem System sicher sehr begeistert.	☐	☐	☐	☐	☐	☐	☐
Ich fühle mich durch das System bevormundet.	☐	☐	☐	☐	☐	☐	☐
Das System erleichtert mir das Erreichen meiner Ziele.	☐	☐	☐	☐	☐	☐	☐
Die Funktionsweise des Systems zu verstehen fordert mich heraus.	☐	☐	☐	☐	☐	☐	☐
Dieses System entspricht meinen Wert-vorstellungen.	☐	☐	☐	☐	☐	☐	☐
Das System weckt positive Erinnerungen in mir.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems verlangt eine hohe geistige Anstrengung.	☐	☐	☐	☐	☐	☐	☐
Ich sehe das System nicht als gleichwertigen Partner in der Interaktion.	☐	☐	☐	☐	☐	☐	☐
Ich finde, ein solches System ist generell nützlich für mein Leben.	☐	☐	☐	☐	☐	☐	☐
Ich bevorzuge es, das System alleine zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Meine Interaktion mit dem System ist klar und verständlich.	☐	☐	☐	☐	☐	☐	☐
Das Erlernen der Bedienung des Systems ist eine Herausforderung für mich.	☐	☐	☐	☐	☐	☐	☐
Ich finde, es kostet viel Anstrengung gut im Umgang mit dem System zu werden.	☐	☐	☐	☐	☐	☐	☐

	stimme gar nicht zu						stimme vollkommen zu
Mir wichtige Personen denken, ich sollte ein solches System nutzen.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems macht mich effektiver.	☐	☐	☐	☐	☐	☐	☐
Ich habe vor ein solches System so viel wie möglich zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Ich würde das System gerne zukünftig nutzen.	☐	☐	☐	☐	☐	☐	☐
Ich glaube, der Preis eines solchen Systems stellt für mich ein Hindernis dar.	☐	☐	☐	☐	☐	☐	☐
Die Nutzung des Systems stellt keine Herausforderung für mich dar.	☐	☐	☐	☐	☐	☐	☐
Das System entwickelt seine Funktionalität erst vollständig wenn mehrere Personen es benutzen.	☐	☐	☐	☐	☐	☐	☐
Die Aufgabenteilung zwischen dem System und mir ist partnerschaftlich.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems fesselt mich.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung eines solchen Systems ist gesellschaftlich angesehen.	☐	☐	☐	☐	☐	☐	☐
Die Interaktion mit dem System erlaubt mir den Ausgang der Handlungen gut zu beeinflussen.	☐	☐	☐	☐	☐	☐	☐
Das System verliert etwas von seinem „Zauber“ wenn man anderen davon berichtet.	☐	☐	☐	☐	☐	☐	☐
Sobald ein solches System käuflich ist, habe ich vor ein ähnliches System für mich zu erwerben.	☐	☐	☐	☐	☐	☐	☐
Ich finde es leicht, das System dazu zu bringen, zu machen was ich möchte.	☐	☐	☐	☐	☐	☐	☐
Während der Benutzung hatte ich das Gefühl, dass das System gut auf meine Befehle reagiert.	☐	☐	☐	☐	☐	☐	☐
Die Zeit ist während der Systemnutzung wie im Flug vergangen.	☐	☐	☐	☐	☐	☐	☐
Durch die Benutzung des Systems habe ich wichtige Fähigkeiten erlernt.	☐	☐	☐	☐	☐	☐	☐
Ich bin vertraut mit dem System.	☐	☐	☐	☐	☐	☐	☐
Bei der Benutzung des Systems fühle ich mich kompetent.	☐	☐	☐	☐	☐	☐	☐
Während der Systembenutzung habe ich alles um mich herum vergessen.	☐	☐	☐	☐	☐	☐	☐
Das System ist erfrischend anders als mir bekannte Systeme.	☐	☐	☐	☐	☐	☐	☐
Insgesamt würde ich das System akzeptieren.	☐	☐	☐	☐	☐	☐	☐
Angenommen, das System stünde mir zur Verfügung, gehe ich davon aus, dass ich das System zukünftig regelmäßig nutzen würde.	☐	☐	☐	☐	☐	☐	☐
Das System ist optisch attraktiv.	☐	☐	☐	☐	☐	☐	☐

	stimme ganz und gar nicht zu		*neutral*		stimme ganz entschieden zu
Ich denke, ich würde die Nintendo Wii gerne häufiger benutzen.	☐	☐	☐	☐	☐
Ich finde die Wii unnötig komplex.	☐	☐	☐	☐	☐
Ich finde, die Wii ist einfach zu benutzen.	☐	☐	☐	☐	☐
Ich denke, ich würde die Unterstützung einer erfahreneren Person brauchen, um in der Lage zu sein, die Wii zu benutzen.	☐	☐	☐	☐	☐
Ich finde, die verschiedenen Funktionen in dieser Konsole sind gut integriert.	☐	☐	☐	☐	☐
Ich denke, es gibt zu viele Inkonsistenzen in diesem System.	☐	☐	☐	☐	☐
Ich könnte mir vorstellen, dass die meisten Leute sehr schnell lernen würden mit dieser Konsole umzugehen.	☐	☐	☐	☐	☐
Ich fand das System sehr schwerfällig im Gebrauch.	☐	☐	☐	☐	☐
Ich fühlte mich sehr sicher bei der Benutzung der Wii.	☐	☐	☐	☐	☐
Ich musste eine Menge lernen, bevor ich mit dieser Konsole zurechtkam.	☐	☐	☐	☐	☐

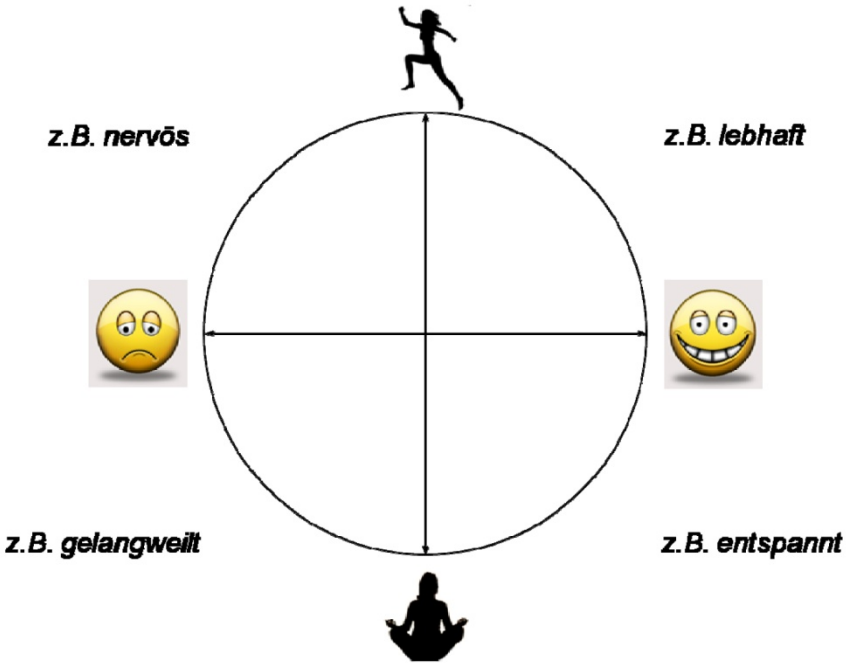
Ihr Urteil !

Bitte geben Sie mit Hilfe der folgenden Wortpaare Ihren Eindruck der Nintendo Wii wieder. Wichtig ist dabei, dass Sie die Konsole und nicht das Spiel beurteilen.
Bitte kreuzen Sie nur jeweils ein Kästchen an!

Bitte ausfüllen...

	1	2	3	4	5	6	7	
menschlich	☐	☐	☐	☐	☐	☐	☐	technisch
isolierend	☐	☐	☐	☐	☐	☐	☐	verbindend
angenehm	☐	☐	☐	☐	☐	☐	☐	unangenehm
originell	☐	☐	☐	☐	☐	☐	☐	konventionell
einfach	☐	☐	☐	☐	☐	☐	☐	kompliziert
fachmännisch	☐	☐	☐	☐	☐	☐	☐	laienhaft
hässlich	☐	☐	☐	☐	☐	☐	☐	schön
praktisch	☐	☐	☐	☐	☐	☐	☐	unpraktisch
sympathisch	☐	☐	☐	☐	☐	☐	☐	unsympathisch
umständlich	☐	☐	☐	☐	☐	☐	☐	direkt
stilvoll	☐	☐	☐	☐	☐	☐	☐	stillos
voraussagbar	☐	☐	☐	☐	☐	☐	☐	unberechenbar
minderwertig	☐	☐	☐	☐	☐	☐	☐	wertvoll
ausgrenzend	☐	☐	☐	☐	☐	☐	☐	einbeziehend
bringt mich den Leuten näher	☐	☐	☐	☐	☐	☐	☐	trennt mich von Leuten
nicht vorzeigbar	☐	☐	☐	☐	☐	☐	☐	vorzeigbar
zurückweisend	☐	☐	☐	☐	☐	☐	☐	einladend
phantasielos	☐	☐	☐	☐	☐	☐	☐	kreativ
gut	☐	☐	☐	☐	☐	☐	☐	schlecht
verwirrend	☐	☐	☐	☐	☐	☐	☐	übersichtlich
abstoßend	☐	☐	☐	☐	☐	☐	☐	anziehend
mutig	☐	☐	☐	☐	☐	☐	☐	vorsichtig
innovativ	☐	☐	☐	☐	☐	☐	☐	konservativ
lahm	☐	☐	☐	☐	☐	☐	☐	fesselnd
harmlos	☐	☐	☐	☐	☐	☐	☐	herausfordernd
motivierend	☐	☐	☐	☐	☐	☐	☐	entmutigend
neuartig	☐	☐	☐	☐	☐	☐	☐	herkömmlich
widerspenstig	☐	☐	☐	☐	☐	☐	☐	handhabbar

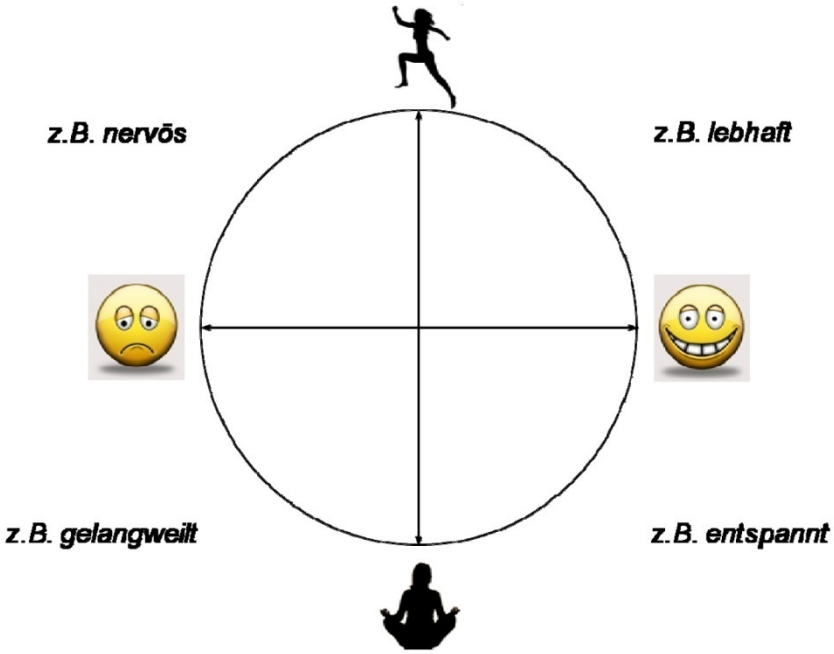
Bitte tragen Sie nun noch einmal Ihre aktuelle Stimmung möglichst genau im untenstehenden Modell ein.



Wenn Sie damit fertig sind, geben Sie mir bitte Bescheid!
Danke!

Tragen Sie hier bitte wieder Ihren persönlichen Identifikationscode ein. Zur Erinnerung, er setzt sich zusammen aus dem ersten Buchstaben des Vornamens Ihrer Mutter, dem ersten Buchstaben des Vornamens Ihres Vaters und den letzten beiden Stellen Ihres Geburtsjahres.

An dieser Stelle würde ich Sie nun bitten, mir erneut Auskunft über Ihre aktuelle Stimmung zu geben. Setzen Sie dazu bitte wieder ein Kreuzchen an die passende Stelle im untenstehenden Diagramm.



Y

	stimme gar nicht zu						stimme vollkommen zu
Ich habe vor ein solches System zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Das System ist leicht zu kontrollieren.	☐	☐	☐	☐	☐	☐	☐
Obwohl ich das System gut beherrsche, wünsche ich mir eine noch direktere Kontrolle.	☐	☐	☐	☐	☐	☐	☐
Ich finde das System umständlich zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Ich werde anderen die Nutzung eines solchen Systems empfehlen.	☐	☐	☐	☐	☐	☐	☐
Durch die Nutzung dieses Systems kann ich deutlich zeigen, dass ich jemand besonderes bin.	☐	☐	☐	☐	☐	☐	☐
Ich fühle mich mit anderen Systemnutzern zusammengehörig.	☐	☐	☐	☐	☐	☐	☐
Die Bedienung des Systems fällt mir leicht zu lernen.	☐	☐	☐	☐	☐	☐	☐
Es war immer klar, ob das System oder ich eine Entscheidung treffen mussten.	☐	☐	☐	☐	☐	☐	☐
Ich glaube, die Nutzung eines solchen Systems ist insgesamt teuer.	☐	☐	☐	☐	☐	☐	☐
Dieses System ist vollkommen neuartig für mich.	☐	☐	☐	☐	☐	☐	☐
Ich finde das System insgesamt gut.	☐	☐	☐	☐	☐	☐	☐
Insgesamt finde ich das System einfach zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Ich habe eine positive Wahrnehmung von der Nutzung eines solchen Systems.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems unterhaltsam.	☐	☐	☐	☐	☐	☐	☐
Es macht mir Spaß, das System direkt zu beherrschen.	☐	☐	☐	☐	☐	☐	☐
Ich finde, die Nutzung eines solchen Systems bringt mir Vorteile.	☐	☐	☐	☐	☐	☐	☐
Ein solches System gewinnt deutlich an Wert, wenn ich jemandem davon erzählen kann.	☐	☐	☐	☐	☐	☐	☐
Ich weiß zu jedem Zeitpunkt, was das System auf meine Befehle hin tun wird.	☐	☐	☐	☐	☐	☐	☐
Ich verstehe die Logik in der Benutzung des Systems.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems spaßig.	☐	☐	☐	☐	☐	☐	☐
Die Anwesenheit anderer ist für ein gutes Ergebnis im Umgang mit dem System eher hinderlich.	☐	☐	☐	☐	☐	☐	☐
Es ist anzunehmen, dass Menschen wie ich solch ein System nutzen werden.	☐	☐	☐	☐	☐	☐	☐
Alles in allem ist es ein ziemlich überflüssiges System.	☐	☐	☐	☐	☐	☐	☐

	stimme gar nicht zu						stimme vollkommen zu
Ich fühle mich anderen überlegen, weil ich in der Lage bin das System zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Die Anwesenheit anderer hat zu einer neuen Sichtweise auf das System geführt.	☐	☐	☐	☐	☐	☐	☐
Ich sehe mich als einen Menschen, der so ein System benutzen würde.	☐	☐	☐	☐	☐	☐	☐
Es fällt mir leicht, mir zu merken wie ich bestimmte Aufgaben mit dem System erledige.	☐	☐	☐	☐	☐	☐	☐
Es weckt Freude in mir, wenn ich an die eigenhändige Bedienung des Systems denke.	☐	☐	☐	☐	☐	☐	☐
Ich finde die Nutzung des Systems aufregend.	☐	☐	☐	☐	☐	☐	☐
Ich finde, das System stellt eine sehr nützliche Hilfestellung dar.	☐	☐	☐	☐	☐	☐	☐
Ich würde meine Systemnutzung lieber vor anderen verheimlichen.	☐	☐	☐	☐	☐	☐	☐
Das System und ich haben nicht gut zusammengearbeitet.	☐	☐	☐	☐	☐	☐	☐
Menschen die ich bewundere, erwarten von mir ein solches System zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Meine Freunde wären von dem System sicher sehr begeistert.	☐	☐	☐	☐	☐	☐	☐
Ich fühle mich durch das System bevormundet.	☐	☐	☐	☐	☐	☐	☐
Das System erleichtert mir das Erreichen meiner Ziele.	☐	☐	☐	☐	☐	☐	☐
Die Funktionsweise des Systems zu verstehen fordert mich heraus.	☐	☐	☐	☐	☐	☐	☐
Dieses System entspricht meinen Wert-vorstellungen.	☐	☐	☐	☐	☐	☐	☐
Das System weckt positive Erinnerungen in mir.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems verlangt eine hohe geistige Anstrengung.	☐	☐	☐	☐	☐	☐	☐
Ich sehe das System nicht als gleichwertigen Partner in der Interaktion.	☐	☐	☐	☐	☐	☐	☐
Ich finde, ein solches System ist generell nützlich für mein Leben.	☐	☐	☐	☐	☐	☐	☐
Ich bevorzuge es, das System alleine zu benutzen.	☐	☐	☐	☐	☐	☐	☐
Meine Interaktion mit dem System ist klar und verständlich.	☐	☐	☐	☐	☐	☐	☐
Das Erlernen der Bedienung des Systems ist eine Herausforderung für mich.	☐	☐	☐	☐	☐	☐	☐
Ich finde, es kostet viel Anstrengung gut im Umgang mit dem System zu werden.	☐	☐	☐	☐	☐	☐	☐

	stimme gar nicht zu						stimme vollkommen zu
Mir wichtige Personen denken, ich sollte ein solches System nutzen.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems macht mich effektiver.	☐	☐	☐	☐	☐	☐	☐
Ich habe vor ein solches System so viel wie möglich zu nutzen.	☐	☐	☐	☐	☐	☐	☐
Ich würde das System gerne zukünftig nutzen.	☐	☐	☐	☐	☐	☐	☐
Ich glaube, der Preis eines solchen Systems stellt für mich ein Hindernis dar.	☐	☐	☐	☐	☐	☐	☐
Die Nutzung des Systems stellt keine Herausforderung für mich dar.	☐	☐	☐	☐	☐	☐	☐
Das System entwickelt seine Funktionalität erst vollständig wenn mehrere Personen es benutzen.	☐	☐	☐	☐	☐	☐	☐
Die Aufgabenteilung zwischen dem System und mir ist partnerschaftlich.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung des Systems fesselt mich.	☐	☐	☐	☐	☐	☐	☐
Die Benutzung eines solchen Systems ist gesellschaftlich angesehen.	☐	☐	☐	☐	☐	☐	☐
Die Interaktion mit dem System erlaubt mir den Ausgang der Handlungen gut zu beeinflussen.	☐	☐	☐	☐	☐	☐	☐
Das System verliert etwas von seinem „Zauber“ wenn man anderen davon berichtet.	☐	☐	☐	☐	☐	☐	☐
Sobald ein solches System käuflich ist, habe ich vor ein ähnliches System für mich zu erwerben.	☐	☐	☐	☐	☐	☐	☐
Ich finde es leicht, das System dazu zu bringen, zu machen was ich möchte.	☐	☐	☐	☐	☐	☐	☐
Während der Benutzung hatte ich das Gefühl, dass das System gut auf meine Befehle reagiert.	☐	☐	☐	☐	☐	☐	☐
Die Zeit ist während der Systemnutzung wie im Flug vergangen.	☐	☐	☐	☐	☐	☐	☐
Durch die Benutzung des Systems habe ich wichtige Fähigkeiten erlernt.	☐	☐	☐	☐	☐	☐	☐
Ich bin vertraut mit dem System.	☐	☐	☐	☐	☐	☐	☐
Bei der Benutzung des Systems fühle ich mich kompetent.	☐	☐	☐	☐	☐	☐	☐
Während der Systembenutzung habe ich alles um mich herum vergessen.	☐	☐	☐	☐	☐	☐	☐
Das System ist erfrischend anders als mir bekannte Systeme.	☐	☐	☐	☐	☐	☐	☐
Insgesamt würde ich das System akzeptieren.	☐	☐	☐	☐	☐	☐	☐
Angenommen, das System stünde mir zur Verfügung, gehe ich davon aus, dass ich das System zukünftig regelmäßig nutzen würde.	☐	☐	☐	☐	☐	☐	☐
Das System ist optisch attraktiv.	☐	☐	☐	☐	☐	☐	☐

	stimme ganz und gar nicht zu		neutral		stimme ganz entschieden zu
Ich denke, ich würde die Nintendo Wii gerne häufiger benutzen.	☐	☐	☐	☐	☐
Ich finde die Wii unnötig komplex.	☐	☐	☐	☐	☐
Ich finde, die Wii ist einfach zu benutzen.	☐	☐	☐	☐	☐
Ich denke, ich würde die Unterstützung einer erfahreneren Person brauchen, um in der Lage zu sein, die Wii zu benutzen.	☐	☐	☐	☐	☐
Ich finde, die verschiedenen Funktionen in dieser Konsole sind gut integriert.	☐	☐	☐	☐	☐
Ich denke, es gibt zu viele Inkonsistenzen in diesem System.	☐	☐	☐	☐	☐
Ich könnte mir vorstellen, dass die meisten Leute sehr schnell lernen würden mit dieser Konsole umzugehen.	☐	☐	☐	☐	☐
Ich fand das System sehr schwerfällig im Gebrauch.	☐	☐	☐	☐	☐
Ich fühlte mich sehr sicher bei der Benutzung der Wii.	☐	☐	☐	☐	☐
Ich musste eine Menge lernen, bevor ich mit dieser Konsole zurechtkam.	☐	☐	☐	☐	☐

Ihr Urteil !

Bitte geben Sie mit Hilfe der folgenden Wortpaare Ihren Eindruck der Nintendo Wii wieder. Wichtig ist dabei, dass Sie die Konsole und nicht das Spiel beurteilen.
Bitte kreuzen Sie nur jeweils ein Kästchen an!

Bitte ausfüllen...

	1	2	3	4	5	6	7	
menschlich	☐	☐	☐	☐	☐	☐	☐	technisch
isolierend	☐	☐	☐	☐	☐	☐	☐	verbindend
angenehm	☐	☐	☐	☐	☐	☐	☐	unangenehm
originell	☐	☐	☐	☐	☐	☐	☐	konventionell
einfach	☐	☐	☐	☐	☐	☐	☐	kompliziert
fachmännisch	☐	☐	☐	☐	☐	☐	☐	laienhaft
hässlich	☐	☐	☐	☐	☐	☐	☐	schön
praktisch	☐	☐	☐	☐	☐	☐	☐	unpraktisch
sympathisch	☐	☐	☐	☐	☐	☐	☐	unsympathisch
umständlich	☐	☐	☐	☐	☐	☐	☐	direkt
stilvoll	☐	☐	☐	☐	☐	☐	☐	stillos
voraussagbar	☐	☐	☐	☐	☐	☐	☐	unberechenbar
minderwertig	☐	☐	☐	☐	☐	☐	☐	wertvoll
ausgrenzend	☐	☐	☐	☐	☐	☐	☐	einbeziehend
bringt mich den Leuten näher	☐	☐	☐	☐	☐	☐	☐	trennt mich von Leuten
nicht vorzeigbar	☐	☐	☐	☐	☐	☐	☐	vorzeigbar
zurückweisend	☐	☐	☐	☐	☐	☐	☐	einladend
phantasielos	☐	☐	☐	☐	☐	☐	☐	kreativ
gut	☐	☐	☐	☐	☐	☐	☐	schlecht
verwirrend	☐	☐	☐	☐	☐	☐	☐	übersichtlich
abstoßend	☐	☐	☐	☐	☐	☐	☐	anziehend
mutig	☐	☐	☐	☐	☐	☐	☐	vorsichtig
innovativ	☐	☐	☐	☐	☐	☐	☐	konservativ
lahm	☐	☐	☐	☐	☐	☐	☐	fesselnd
harmlos	☐	☐	☐	☐	☐	☐	☐	herausfordernd
motivierend	☐	☐	☐	☐	☐	☐	☐	entmutigend
neuartig	☐	☐	☐	☐	☐	☐	☐	herkömmlich
widerspenstig	☐	☐	☐	☐	☐	☐	☐	handhabbar

Nun haben Sie den ersten Teil der Untersuchung abgeschlossen. Sie werden in 2 Wochen eine E-mail bekommen, die Sie auffordern wird an der abschließenden Online-Befragung teilzunehmen. Bis dahin bedanke ich mich schon einmal herzlich!

B. Tasks for Study 1: Nintendo Wii Motion Plus™

Sie haben nun bis zu **5 min.** Zeit sich mit dem Spiel Bogenschießen vertraut zu machen. Dafür steht Ihnen eine Anleitung zur Verfügung.

Sollten Sie sich früher sicher fühlen, können Sie die Übungsphase jederzeit auch vor Ablauf der 5 min. beenden.

Nach der Übungsphase soll Ihr Ziel sein innerhalb eines Durchganges mindestens **90 Punkte** zu erreichen.

Ein Durchgang beinhaltet insgesamt 4 Einzelrunden mit je 3 Pfeilen. Sollten Sie die 90 Punkte nicht gleich beim ersten Durchgang erreichen, können Sie direkt den nächsten Versuch starten.

Insgesamt stehen Ihnen **10 min.** zur Verfügung.

C. Tasks (first laboratory setup) for Study 2: Apple iPad

1.

Gehen Sie bitte auf den Homescreen, der wie folgt aussieht:

2.

Setzen Sie bitte einen Termin mit folgenden Daten:

Titel: „Usability-Test“.

Ort: „IAD“ am 1. Februar 2011 von 15:30-16:35 Uhr.
Wiederholen: Niemals

Erinnerung: 1 Tag vorher

Kehren Sie anschließend wieder auf den Homescreen zurück.

3.

Stellen Sie bitte als standardmäßig verwendete Suchmaschine „Yahoo“ ein.

Kehren Sie anschließend wieder auf den Homescreen zurück.

4.

Schreiben Sie bitte folgende Notiz
„Ich nehme heute an einem Usability-Test teil.“

Kehren Sie anschließend wieder auf den Homescreen zurück.

5.

Stellen Sie bitte die Software-Tastaturbelegung auf „QWERTY“ um.

Kehren Sie anschließend wieder auf den Homescreen zurück.

D. Interview (first laboratory setup) Study 2: Apple iPad™

1. Allgemein

1. Was weißt du bisher über das iPad?
5. Was hältst du vom iPad?
6. Was gefällt dir am iPad?
7. Was gefällt dir am iPad nicht?
8. Welche Eigenschaften hat das iPad?

(Laddering: Welchen Nutzen bringt das für dich? Warum ist das wichtig für dich? etc.)

2. Nutzung

Angenommen, du könntest dir die Eigenschaften und Funktionen eines iPad aussuchen…

9. Welche Eigenschaften und Funktionen sollte es haben, damit du es nutzen willst?
10. Welche Eigenschaften und Funktionen würden dazu führen, dass du das iPad nicht benutzt?

Jetzt geht es um das iPad wie es aktuell auf dem Markt ist…

11. Könntest du dir generell vorstellen, ein iPad, wenn es dir zur Verfügung stehen würde, zu nutzen? (warum?)

Angenommen, einem guten Freund steht ein iPad zur Verfügung…

12. Du willst ihn davon überzeugen, dieses zu nutzen. Welche Argumente würdest du hervorbringen?
13. Du willst ihn davon überzeugen, dieses nicht zu nutzen. Welche Argumente würdest du anbringen?

Welche Punkte spielen eine Rolle bei deiner Entscheidung, ein iPad zu nutzen oder nicht zu nutzen? (Laddering 14.-22.)

14. <<Probanden antworten lassen, ggf. folgende Punkte ergänzen>>
15. Welche Rolle spielt der Spaßfaktor bei der Nutzung für dich?
16. In wieweit spielt es eine Rolle, dass das iPad von Apple ist? (Apple-positiv, negativ oder neutral?)
17. (Bevorzugst du Produkte bestimmter Marken?)
18. Welche Bedeutung hat es für dich, ein Gerät zu nutzen, das nicht jeder hat?
19. Welche Rolle spielt es für dich, dass das iPad ein neueres Produkt auf dem Markt ist?
20. Welche Bedeutung hat für dich das Gefühl von Kontrolle über das Gerät?

21. Welchen Einfluss hat dein soziales Umfeld bezüglich Kauf, Nutzung und Meinung zum iPad?

22. Welchen Stellenwert hat die Einfachheit der Bedienung für dich?

23. Welche Bedeutung hat das Design für dich? (Wie soll das Design sein?)

3. Kauf

24. Könntest du dir vorstellen, ein iPad zu kaufen?

25. Welche Punkte spielen bei deiner Entscheidung eine Rolle? (Die gleichen wie bei der Nutzung? Sind zusätzliche Aspekte für dich wichtig? z.B. der Preis?)

26. Weißt du, wie viel das iPad kostet?

27. Bis zu welchem Preis würdest du es dir kaufen?

28. Dein bester Freund überlegt, sich ein iPad zu kaufen. Was rätst du ihm? Und warum?

E. Diary Study 2: Apple iPad™

Sehr geehrter Versuchsteilnehmer,

hierbei handelt es sich um die Tagebuchfragebögen. Sie sind zeitlich markiert und wir bitten sie jeden Tag den passenden Fragebogen auszufüllen damit wir die zeitliche Veränderung der zu ermittelnden Größen bestimmen können. Auch hier gilt, beantworten sie alle Fragen passend für den Moment.

Tragen sie zunächst bitte den vorhin von ihnen bestimmten Code ein, damit später die Fragebögen zugeordnet werden können:

Beispiel:

Ihre Mutter heißt Inge (I), Ihr Vater Klaus (K) und Sie sind 1975 geboren (75)
Ihr Code wäre dann **IK75**

Bitte tragen Sie hier Ihren Code ein:_____

Sollten sich noch weitere Fragen im laufe der Studie ergeben wenden sie sich bitte an Frau Marlene Heil (0151-17368568) oder Herrn Jan Götze (0179-5310161)

Tagebuch, Tag 1
04.01.2011

„Gab es heute ein Ereignis, eine Bemerkung oder ein Erlebnis, das Ihre Bewertung des Systems verändert hat?“ ☐Ja ☐Nein

Bei ja: Handelt es sich um eine Verbesserung/Verschlechterung? (Zutreffendes bitte Unterstreichen)

Beschreiben Sie bitte in einigen Worten, was passiert ist:

Tragen sie hier bitte alle Apps ein, die sie heute genutzt haben:

Wie lange wurde das IPad heute von ihnen genutzt? _____ h _____ min

		Trifft gar nicht zu						Trifft voll zu
1	Das IPad gewinnt deutlich an Wert, wenn ich jemandem davon erzählen kann.	☐	☐	☐	☐	☐	☐	☐
2	Ich finde die Nutzung des IPads unterhaltsam.	☐	☐	☐	☐	☐	☐	☐
3	Es ist anzunehmen, dass Menschen wie ich solch ein System nutzen werden.	☐	☐	☐	☐	☐	☐	☐
4	Das IPad ist leicht zu kontrollieren.	☐	☐	☐	☐	☐	☐	☐
5	Mir wichtige Personen denken, ich sollte ein solches System nutzen.	☐	☐	☐	☐	☐	☐	☐
6	Ich finde die Nutzung des IPads aufregend.	☐	☐	☐	☐	☐	☐	☐
7	Ich finde, die Nutzung eines solchen Systems bringt mir Vorteile.	☐	☐	☐	☐	☐	☐	☐
8	Während der Benutzung hatte ich das Gefühl, dass das IPad gut auf meine Befehle reagiert.	☐	☐	☐	☐	☐	☐	☐
9	Insgesamt würde ich das IPad akzeptieren.	☐	☐	☐	☐	☐	☐	☐
10	Insgesamt finde ich das IPad einfach zu benutzen	☐	☐	☐	☐	☐	☐	☐
11	Ich finde das IPad insgesamt gut.	☐	☐	☐	☐	☐	☐	☐
12	Angenommen, das IPad stünde mir zu Verfügung, gehe ich davon aus, dass ich das System zukünftig regelmäßig nutzen würde.	☐	☐	☐	☐	☐	☐	☐
13	Die Benutzung des IPads fesselt mich.	☐	☐	☐	☐	☐	☐	☐
14	Durch die Nutzung des IPads kann ich deutlich zeigen, dass ich jemand besonderes bin.	☐	☐	☐	☐	☐	☐	☐
15	Ich finde das Design des IPads ansprechend	☐	☐	☐	☐	☐	☐	☐
16	Die Nutzung des IPads steigert meine Wissbegierde	☐	☐	☐	☐	☐	☐	☐
17	Wenn ich mit dem IPad interagiere vergesse ich oft die Zeit	☐	☐	☐	☐	☐	☐	☐

OO

Tagebuch, Tag 7
10.01.2011

„Gab es heute ein Ereignis, eine Bemerkung oder ein Erlebnis, das Ihre Bewertung des Systems verändert hat?“ ☐Ja ☐Nein

Bei ja: Handelt es sich um eine Verbesserung/Verschlechterung? (Zutreffendes bitte Unterstreichen)

Beschreiben Sie bitte in einigen Worten, was passiert ist:

Tragen sie hier bitte alle Apps ein, die sie heute genutzt haben:

Wie lange wurde das IPad heute von ihnen genutzt? _____ h _____ min

		Trifft gar nicht zu						Trifft voll zu
1	Das IPad entspricht meinen Wertvorstellungen.	☐	☐	☐	☐	☐	☐	☐
2	Es fällt mir leicht zu merken, wie ich bestimmte Aufgaben mit dem IPad erledige.	☐	☐	☐	☐	☐	☐	☐
3	Das IPad gewinnt deutlich an Wert, wenn ich jemandem davon erzählen kann.	☐	☐	☐	☐	☐	☐	☐
4	Ich finde die Nutzung des IPads unterhaltsam.	☐	☐	☐	☐	☐	☐	☐
5	Das IPad und ich haben wie eine Einheit funktioniert.	☐	☐	☐	☐	☐	☐	☐
6	Die Bedienung des IPads fällt mir leicht zu lernen.	☐	☐	☐	☐	☐	☐	☐
7	Obwohl ich das IPad gut beherrsche, wünsche ich mir eine noch direktere Kontrolle.	☐	☐	☐	☐	☐	☐	☐
8	Durch die Benutzung des IPads habe ich wichtige Fähigkeiten erlernt.	☐	☐	☐	☐	☐	☐	☐
9	Das IPad erleichtert mir das Erreichen meiner Ziele.	☐	☐	☐	☐	☐	☐	☐
10	Die Benutzung des IPads ist gesellschaftlich angesehen.	☐	☐	☐	☐	☐	☐	☐
11	Insgesamt finde ich das IPad einfach zu benutzen.	☐	☐	☐	☐	☐	☐	☐
12	Ich weiß zu jedem Zeitpunkt, was das IPad auf meine Befehle hin tun wird.	☐	☐	☐	☐	☐	☐	☐
13	Ich würde das IPad gerne zukünftig nutzen.	☐	☐	☐	☐	☐	☐	☐
14	Es ist anzunehmen, dass Menschen wie ich solch ein System nutzen werden.	☐	☐	☐	☐	☐	☐	☐
15	Alles in allem ist es ein ziemlich überflüssiges System.	☐	☐	☐	☐	☐	☐	☐
16	Bei der Benutzung des IPads fühle ich mich kompetent.	☐	☐	☐	☐	☐	☐	☐
17	Ich habe eine positive Wahrnehmung von der Nutzung eines solchen Systems.	☐	☐	☐	☐	☐	☐	☐

QQ

		Trifft gar nicht zu						Trifft voll zu
18	Ich sehe das IPad nicht als gleichwertigen Partner in der Interaktion.	☐	☐	☐	☐	☐	☐	☐
19	Das IPad ist leicht zu kontrollieren.	☐	☐	☐	☐	☐	☐	☐
20	Mir wichtige Personen denken, ich sollte ein solches System nutzen.	☐	☐	☐	☐	☐	☐	☐
21	Ich finde die Nutzung des IPads aufregend.	☐	☐	☐	☐	☐	☐	☐
22	Ich finde, die Nutzung eines solchen Systems bringt mir Vorteile.	☐	☐	☐	☐	☐	☐	☐
23	Während der Benutzung hatte ich das Gefühl, dass das IPad gut auf meine Befehle reagiert.	☐	☐	☐	☐	☐	☐	☐
24	Das IPad und ich haben nicht gut zusammengearbeitet.	☐	☐	☐	☐	☐	☐	☐
25	Insgesamt würde ich das IPad akzeptieren.	☐	☐	☐	☐	☐	☐	☐
26	Ich finde das IPad insgesamt gut.	☐	☐	☐	☐	☐	☐	☐
27	Die Anwesenheit anderer hat zu einer neuen Sichtweise auf das IPad geführt.	☐	☐	☐	☐	☐	☐	☐
28	Das IPad ist erfrischend anders als mir bekannte Systeme.	☐	☐	☐	☐	☐	☐	☐
29	Ich fühle mich mit anderen IPad-Nutzern zusammengehörig.	☐	☐	☐	☐	☐	☐	☐
30	Ich finde es leicht, das IPad dazu zu bringen, zu machen was ich möchte.	☐	☐	☐	☐	☐	☐	☐
31	Angenommen, das IPad stünde mir zu Verfügung, gehe ich davon aus, dass ich das System zukünftig regelmäßig nutzen würde.	☐	☐	☐	☐	☐	☐	☐
32	Die Benutzung des IPads fesselt mich.	☐	☐	☐	☐	☐	☐	☐
33	Ich finde die Nutzung des IPads spaßig.	☐	☐	☐	☐	☐	☐	☐
34	Durch die Nutzung des IPads kann ich deutlich zeigen, dass ich jemand besonderes bin.	☐	☐	☐	☐	☐	☐	☐

		Trifft gar nicht zu						Trifft voll zu
35	Ich finde das Design des IPads ansprechend	☐	☐	☐	☐	☐	☐	☐
36	Die Nutzung des IPads steigert meine Wissbegierde	☐	☐	☐	☐	☐	☐	☐
37	Wenn ich mit dem IPad interagiere vergesse ich oft die Zeit	☐	☐	☐	☐	☐	☐	☐
38	Ich glaube, der Preis eines solchen Systems stellt für mich ein Hindernis dar.	☐	☐	☐	☐	☐	☐	☐

F. Tasks (second laboratory setup) for Study 2: Apple iPad™

1.

Schalten Sie bitte das iPad ein und gehen Sie auf den Homescreen, der wie folgt aussieht:

2.

Setzen Sie bitte einen Termin mit folgenden Daten:

Titel: „Monatsanfang“.

Ort: „IAD“

Am: 1. März 2011, ganztägig

Wiederholen: Monatlich

Erinnerung: 1 Stunde vorher

Kehren Sie anschließend wieder auf den Homescreen zurück.

3.

Stellen Sie bitte einen Ton für das Ereignis „E-Mail gesendet“ ein.

Kehren Sie anschließend wieder auf den Homescreen zurück.

4.

Fügen Sie bitte einen Kontakt-Eintrag mit folgenden Daten hinzu:

Vorname: Erika
Name: Mustermann
E-Mail: Erika@Mustermann.de
Geburtstag: 1.1.1980

Kehren Sie anschließend wieder auf den Homescreen zurück.

5.

Stellen Sie bitte „Text in Mail und Notizen vergrößern auf 48 pt“ ein.

Kehren Sie anschließend wieder auf den Homescreen zurück.

G. Interview (first laboratory setup) Study 2: Apple iPad™

1. Testphase

2. In wieweit hat das iPad deinen Erwartungen und Vorstellungen entsprochen?
3. Was hat dich, verglichen mit deinem Eindruck vor 14 Tagen positiv überrascht?
4. Was hat dich, verglichen mit deinem Eindruck vor 14 Tagen negativ überrascht?

2. Allgemein

5. Was hältst du vom iPad?
6. Was gefällt dir am iPad?
7. Was gefällt dir am iPad nicht?
8. Welche Eigenschaften hat das iPad?

(Laddering: Welchen Nutzen bringt das für dich? Warum ist das wichtig für dich? etc.)

3. Nutzung

Angenommen, du könntest dir die Eigenschaften und Funktionen eines iPad aussuchen…

9. Welche Eigenschaften und Funktionen sollte es haben, damit du es nutzen willst?
10. Welche Eigenschaften und Funktionen würden dazu führen, dass du das iPad nicht benutzt?

Jetzt geht es um das iPad wie es aktuell auf dem Markt ist…

11. Könntest du dir generell vorstellen, ein iPad, wenn es dir zur Verfügung stehen würde, zu nutzen? (warum?)

Angenommen, einem guten Freund steht ein iPad zur Verfügung…

12. Du willst ihn davon überzeugen, dieses zu nutzen. Welche Argumente würdest du hervorbringen?
13. Du willst ihn davon überzeugen, dieses nicht zu nutzen. Welche Argumente würdest du anbringen?

Welche Punkte spielen eine Rolle bei deiner Entscheidung, ein iPad zu nutzen oder nicht zu nutzen? (Laddering 14.-22.)

14. <<Probanden antworten lassen, ggf. folgende Punkte ergänzen>>
15. Welche Rolle spielt der Spaßfaktor bei der Nutzung für dich?
16. In wieweit spielt es eine Rolle, dass das iPad von Apple ist? (Apple-positiv, negativ oder neutral?)

17. (Bevorzugst du Produkte bestimmter Marken?)
18. Welche Bedeutung hat es für dich, ein Gerät zu nutzen, das nicht jeder hat?
19. Welche Rolle spielt es für dich, dass das iPad ein neueres Produkt auf dem Markt ist?
20. Welche Bedeutung hat für dich das Gefühl von Kontrolle über das Gerät?
21. Welchen Einfluss hat dein soziales Umfeld bezüglich Kauf, Nutzung und Meinung zum iPad?
22. Welchen Stellenwert hat die Einfachheit der Bedienung für dich?
23. Welche Bedeutung hat das Design für dich? (Wie soll das Design sein?)

4. Kauf

24. Könntest du dir vorstellen, ein iPad zu kaufen?
25. Welche Punkte spielen bei deiner Entscheidung eine Rolle? (Die gleichen wie bei der Nutzung? Sind zusätzliche Aspekte für dich wichtig? z.B. der Preis?)
29. Weißt du, wie viel das iPad kostet?
30. Bis zu welchem Preis würdest du es dir kaufen?
31. Dein bester Freund überlegt, sich ein iPad zu kaufen. Was rätst du ihm? Und warum?

H. Interview Study 3: Ricoh Aficio 3350™

Identifikationscode des jeweiligen Probanden aufzeichnen.

Teil 1: Allgemeine Fragen

1. Was weißt du bisher über das eben genutzte Multifunktionssystem?
2. Was hältst du von diesem Multifunktionssystem?
3. Was gefällt dir an diesem Multifunktionssystem?
4. Was gefällt dir an diesem Multifunktionssystem nicht?

   (→ Laddering: Welchen Nutzen bringt das für dich? Warum ist das wichtig für dich? etc.)

Teil 2: Fragen zur Nutzung

5. In wieweit hat das Multifunktionssystem deinen Erwartungen und Vorstellungen entsprochen?

Angenommen (jetzt betrachten wir den fiktiven Fall), du könntest dir die Eigenschaften und Funktionen eines Multifunktionssystems aussuchen…

6. Welche Eigenschaften und Funktionen sollte es haben, damit du es nutzen willst?
7. Welche Eigenschaften und Funktionen würden dazu führen, dass du das Multifunktionssystem nicht benutzt?

Jetzt geht es um das Multifunktionssystem wie es aktuell auf dem Markt ist…

8. Könntest du dir generell vorstellen, ein Multifunktionssystem, wenn es dir zur Verfügung stehen würde, zu nutzen? (→ Warum?)

Welche Punkte spielen eine Rolle bei deiner Entscheidung, ein Multifunktionssystem zu nutzen oder nicht zu nutzen? (→ Laddering Fragen 10. bis 14.)

9. <<Probanden antworten lassen, ggf. folgende Punkte ergänzen>>
10. Inwieweit spielt es eine Rolle, dass das Multifunktionssystem von einer bestimmten Marke ist (Ricoh, Lexmark, Canon, Konica, etc.)?
11. Welche Rolle spielt es für dich, dass das dir zur Verfügung stehende Multifunktionssystem immer eines der neuesten Modelle auf dem Markt ist?
12. Welche Bedeutung hat für dich das Gefühl von Kontrolle über das Gerät?
13. Welchen Stellenwert hat die Einfachheit der Bedienung für dich?
14. Welche Bedeutung hat das Design für dich? (Wie soll das Design sein?)

Teil 3: Fragen zum Kauf

Angenommen, dein Chef spielt mit der Überlegung ein Multifunktionssystem für das Büro anzuschaffen…

15. Du willst ihn davon überzeugen, diese Überlegung in die Tat umzusetzen. Welche Argumente würdest du hervorbringen?
16. Du willst ihn davon überzeugen, das Multifunktionssystem nicht anzuschaffen. Welche Argumente würdest du anbringen?

Angenommen, du bist selbst der Chef eines neugegründeten Unternehmens und befindest dich in der Büroeinrichtungsphase…

17. Könntest du dir vorstellen, ein Multifunktionssystem für das Büro zu kaufen?
18. Welche Punkte spielen bei deiner Entscheidung eine Rolle? (Die gleichen Punkte wie bei der Nutzung? Sind zusätzliche Aspekte für dich wichtig? Z. B. der Preis?)
19. Weißt du, wie viel ein Multifunktionssystem ungefähr kostet? (ab ca. 800 Euro)
20. Bis zu welchem Preis würdest du es für dein Unternehmen kaufen?

Vielen Dank für die Teilnahme an dieser wissenschaftlichen Studie.

I. Tasks Study 3: Ricoh Aficio 3350^{TM}

Aufgabe 1:

Bitte nehmen Sie die Blätter 1 bis 6 und kopieren diese einmal im Duplexmodus.

Die Aufgabe endet mit der Löschung aller vorgenommenen Einstellungen am Multifunktionsgerät.

Aufgabe 2:

Bitte nehmen Sie die Blätter 1 bis 3 und kopieren diese zweimal. Der Ausdruck soll in einer Sortierung von 1 bis 3 erfolgen (also 1; 2; 3; 1; 2; 3 und nicht 1; 1; 2; 2; 3; 3).

Die Aufgabe endet mit der Löschung aller vorgenommenen Einstellungen am Multifunktionsgerät.

Aufgabe 3:

Bitte nehmen Sie die Blätter 1 bis 2 und kopieren diese auf ein einzelnes DIN A4 Blatt im Querformat.

Die Aufgabe endet mit der Löschung aller vorgenommenen Einstellungen am Multifunktionsgerät.

Aufgabe 4:

Bitte nehmen Sie die Blätter 1 bis 4 und kopieren diese auf ein einzelnes DIN A3 Blatt.

Die Aufgabe endet mit der Löschung aller vorgenommenen Einstellungen am Multifunktionsgerät.

Aufgabe 5:

Bitte rufen Sie die Liste der zuletzt gescannten Dateien auf.

Die Aufgabe endet mit dem zurückgehen in das Ausgangsmenü des Scanner-Modus.

Aufgabe 6:

Bitte nehmen Sie das Blatt 1 und scannen dieses im Modus „Graustufen“ ein. Es soll an Frau Michaela Kauer per E-Mail verschickt werden.